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ENERGY INNOVATION AND THE PATENT PROCESS

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY, NUCLEAR PROLIFERATION, AND
GOVERNMENT PROCESSES

OF THE

COMMITTEE ON
GOVERNMENTAL AFFAIRS
UNITED STATES SENATE

NINETY-NINTH CONGRESS

SECOND SESSION

JULY 30, 1986

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ENERGY INNOVATION AND THE PATENT PROCESS

WEDNESDAY, JULY 30, 1986

U.S. SENATE,
SUBCOMMITTEE ON ENERGY, NUCLEAR
PROLIFERATION, AND GOVERNMENT PROCESSES,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, DC.

The subcommittee met at 9:59 a.m. in room SD-342, Dirksen Senate Office Building, Hon. Thad Cochran (chairman of the subcommittee) presiding.

Present: Senators Cochran and Glenn.

OPENING STATEMENT OF SENATOR COCHRAN

Senator COCHRAN. The subcommittee will please come to order. I would like to welcome all of you to this hearing of the Subcommittee on Energy, Nuclear Proliferation, and Government Processes of the Governmental Affairs Committee of the U.S. Senate.

The purpose of the hearing today is to examine the Patent and Trademark Office's review of Mr. Joseph Newman's application for a patent on his energy machine. It is our understanding that Mr. Newman has attempted for 7 years to obtain a patent for an energy generating device which, if it works as claimed, could revolutionize the energy industry, and provide a new source of inexpensive, safe, nonpolluting, usable energy.

The Patent and Trademark Office has refused to issue a patent for the invention stating, among other things, that it appears to be a perpetual motion machine and therefore, scientifically impossible. Mr. Newman has taken his case to Federal court, and the trial on the issues is scheduled for later this year.

This subcommittee is not purporting to hear the case as a court would hear it. We are interested in determining whether or not a legislative remedy or a legislative action is indicated.

Members of the House of Representatives have introduced legislation to direct the issuance of a patent. A part of the inquiry of this subcommittee will be to determine whether or not that is an appropriate action for Congress to take, if there is any precedent for it, and whether or not the facts justify that action by the Congress.

We will hear from Mr. Newman and expert witnesses who will describe the technical aspects and characteristics of this energy device. We will hear from representatives of the Bureau of Standards, the Patent and Trademark Office, and the Department of

Energy in our effort to find out what the facts are and whether or not congressional action is indicated.

We really do appreciate having in advance written statements from our witnesses, and we thank you for your cooperation with the subcommittee. Let me invite as our first panel of witnesses Members of Congress who have sponsored legislation relating to this issue.

I see Tom Kindness, a Congressman from Ohio, is here. There may be others in the room. Let me invite all Members of Congress to come forward now and present whatever statements you may care to at this time.

Congressman, we appreciate your being here. It is good to see you. We have a copy of your written statement,[1] which we will make a part of the record and we would encourage you to make whatever summary comments you choose to at this time. Welcome. You may proceed.

TESTIMONY OF HON. TOM KINDNESS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OHIO

Representative KINDNESS. Thank you, Mr. Chairman, and it is a pleasure to have the opportunity to share some views with this subcommittee. I would not be here, nor would I be an author of a private relief bill, were it not for the fact that I think our system of patent law has been invaded by a lack of reason, and logic, in the case of Mr. Joseph Newman's application for a patent.

If I were to look at this record, the record of this case, in the Patent and Trademark Office and in the courts, from a completely dispassionate view, as I believe I have, I would say something is very wrong with the way the process has been dealt with.

I can't find the fault on the part of the applicant. I can find in the process quite a bit that is of concern to me, as a legislator, on the part of the Patent and Trademark Office, and more particularly, in the court since the process have moved to that forum.

Just three outstanding events in this 7-year process ought to be brought into focus, it seems to me. On March 13, 1982, Mr. Newman appeared before a high level Patent Office committee consisting of Samuel Engel, who acted as judge or administrative judge; Mr. Truhe and Mr. Miller, who are supervisors, and Mr. Dugan, patent examiner, and was told, "Your invention works, but your technical description is inadequate."

On September 30, 1982, Mr. Newman was told by the Board of Appeals of the Patent and Trademark Office that, "Your technical description is adequate, but your invention doesn't work."

After these contradictory statements, Mr. Newman filed suit in the Federal District Court, U.S. District Court for the District of Columbia, and in August 1984, a special master, William E. Schuyler, Jr. was appointed. It was after being nominated by the Patent and Trademark Office. He was appointed to evaluate the energy machine since Judge Jackson of the court had stated that he did not feel personally competent to render such an evaluation.

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[1] See p. 53.

Mr. Schuyler is a former Commissioner of the PTO and is a highly qualified electrical engineer, and after evaluating the energy device, Mr. Schuyler stated for the record that, "Evidence before the PTO and this court is overwhelming that Mr. Newman has built and tested a prototype of his invention in which the output energy exceeds the internal input energy. There is no contradictory factual evidence."

Mr. Chairman, rule 53 of the Federal Rules of Civil Procedure provides that the court shall accept the finding of a special master in a situation like this unless there is clearly erroneous evidence or clearly erroneous finding, and the court, indeed, refused to accept these findings.

Yet it didn't identify any evidence that was clearly erroneous, and Mr. Newman was charged $11,000 to pay for the special master's work.

Mr. Chairman, things have gone on since that time in the way of testing of the device about which I am sure you will hear more in today's testimony of other witnesses. I don't profess to know anything about the technical aspects of Mr. Newman's invention. Nor do I think that there is often much reason to be so critical of the Patent and Trademark Office or of the functioning of our court system with respect to patent law.

On this occasion, I have not heard anything that is exculpatory in nature for what has happened to Mr. Newman. The treatment that Mr. Newman has received in this whole process strikes me as being somewhat medieval and not consistent with the way our laws are supposed to work in our Republic. It is that, flat out, in my thinking, Mr. Chairman, that brings me to this morning.

I think I speak with some degree of representation of my colleagues in the House who have similarly introduced private legislation. We have each introduced our separate bills in the House because under the rules, there cannot be more than one sponsor of a private bill.

But we all seem to be headed in the same direction, Mr. Chairman, at attempting to achieve some kind of justice through causing our system of laws to work properly. If Mr. Newman's invention doesn't make it in the marketplace, it will not be very much different from many other inventions that have been patented but haven't made it in the marketplace.

But if, indeed, it proves its value in the marketplace, that is something that we would all hope to see. It should, indeed, be very important to our society. I don't purport to make a judgment as to whether that will occur, Mr. Chairman. My concern is only that our system of laws operate as it should.

Senator COCHRAN. Thank you very much, Congressman, for your very helpful comments. We want to remind everyone that there should not be any reaction on the part of the audience or those who are present here in the hearing to the testimony of any witness. We would appreciate the observance of those rules of the committee and of the U.S. Senate.

We have other Members of Congress who have indicated an interest in having their statements included in the record who were unable to be at the hearing this morning: Congressman Trent

Lott,[2] Congressman Wayne Dowdy,[3] and Senator John Stennis [4] have sent statements to be included in the hearing record. Those are the statements which we have here at the desk, and all of these will be included in the record at this point.

Are there other Members of Congress who wish to testify? Please come forward.

Congressman Burton is a Member of the House who introduced the first legislation in this issue. Please be seated.

Mr. BURTON. Mr. Chairman, we have a vote, and I have about 7 minutes to make it. Would it be possible to make the vote and then come right back?

Senator COCHRAN. That is certainly all right. When you return, we will interrupt our hearing and let you testify at that point. We understand that completely.

Mr. BURTON. Thank you, Mr. Chairman.

Senator COCHRAN. Let's then begin with our second panel of witnesses, Mr. Rene Tegtmeyer, Assistant Commissioner for Patents of the U.S. Patent and Trademark Office in Washington, DC, and Dr. John W. Lyons, Director of the National Engineering Laboratory of the National Bureau of Standards.

We welcome you to the hearing, and thank you for being here. We have copies of statements with reports attached, all of which will be made a part of the hearing record. We thank you for providing those to us, and they will be included in full. We hope you will be able to summarize those statements so we will have an opportunity for a discussion of these issues after you complete your presentations to the subcommittee.

Let's begin with Mr. Tegtmeyer. You may proceed.

TESTIMONY OF RENE D. TEGTMEYER, ASSISTANT COMMISSIONER FOR PATENTS, U.S. PATENT AND TRADEMARK OFFICE, WASHINGTON, DC [5]

Mr. TEGTMEYER. Thank you, Mr. Chairman. It is my pleasure to testify before this subcommittee on behalf of the Patent and Trademark Office. I will be abbreviating the rather lengthy statement that we submitted for the record.

In my position as Assistant Commissioner for Patents. I am charged with the administration of and supervisory authority over the Patent Examining Corps. The main functions of the Patent and Trademark Office are administering the patent and trademark laws as they pertain to the granting of patents and the registration of trademarks. The examination of patent applications is the largest and one of the key functions of the office.

This work is divided among 15 examining groups, each group having jurisdiction over certain assigned areas of technology. Each group includes a number of suborganizations which we call art units. Each of approximately 100 art units throughout the Patent and Trademark Office is responsible for a particular area of technology.

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[2] See Congressman Lott's prepared statement on p. 88.
[3] See Congressman Dowdy's prepared statement on p. 89.
[4] See Congressman Stennis' prepared statement on p. 90.
[5] See p. 56 for Mr. Tegtmeyer's prepared statement.

An art unit is composed of about 13 examiners who review patent applications and decide whether patents can be granted. Each of the 1,400 examiners in the Patent and Trademark Office handles patent applications related to the field of technology in which he or she has been trained and is familiar.

A total of 125,931 patent applications, including design patent applications, were filed in fiscal year 1985. During fiscal year 1985, 75,302 patents were granted.

The patent examination system begins with the receipt of a patent application. The application is given a serial number and a filing date, and evaluated as to certain formal matters. It is then forwarded to one of the 15 examining groups that I mentioned before for assignment to an examiner familiar with that technology.

The examination of an application begins with a careful study of the application and its technical contents by the examiner to whom it has been assigned. The examiner determines exactly what the invention is alleged to be and conducts a search of the Office records to see if the invention is the same as or obvious in view of the technology already described in earlier United States or foreign patents or the technical literature, known collectively as the prior art.

The examiner also determines whether the invention has utility and whether it is clearly described in a way that teaches others how to make and use it. The examiner communicates his initial conclusions on patentability to the applicant. A communication called a first office action explains any reasons why the invention is unpatentable, citing and providing copies of relevant prior art found in the search.

Additionally, the first action points out any formal deficiencies in the application and, where possible, offers suggestions as to how the invention may be more precisely defined. It also identifies any problems with the completeness of the description and the utility of the invention.

A reasonable period is provided for a response from the applicant. Responses may include amendments to the claims and arguments as to why the examiner's conclusions are wrong. The applicant's response is taken up, in turn, by the examiner for further consideration and evaluation of the arguments and evidence of patentability submitted in the response.

The examiner, if needed, conducts an updating or further search of a prior art. If the applicant's response successfully disposes of all of the examiner's concerns over both formal and substantive issues, the application is processed for the grant of a patent. On the other hand, the examiner and the applicant may reach an impasse over the question of patentability. If so, the examiner sends what is called a final rejection to the applicant explaining the Office's stance on the still unresolved patentability issues.

This final rejection closes the prosecution of the application. Only very limited matters may thereafter be raised by the applicant, in most cases, only with the examiner's authorization. During the process, interviews with examiners may be arranged.

An applicant dissatisfied with the final rejection of some or all of the claims in the application or otherwise in disagreement with the examiner over issues of patentability may appeal to the Board of

Patent Appeals and Interferences, formerly called the Board of Appeals.

An appeal is normally heard by three Board members. Disagreement over a procedural or formal matter, on the other hand, is handled by an applicant's petition to the Commissioner. If a decision of the Board of Appeals and Interferences is still adverse to the applicant, an appeal may be taken to the U.S. Court of Appeals for the Federal Circuit or a civil action which may be filed in the District Court for the District of Columbia against the Commissioner.

The court, in the appeal, will review the record made in the Office and may affirm or reverse the Office's action. In a civil action, the applicant may present new evidence or testimony to the court for consideration in deciding patentability.

A patent application includes a specification or a written description of the invention, including at least one claim, an oath or declaration, a drawing, where appropriate, and the filing fee. The oath is the inventor's statement that he believes himself to be the first and original inventor of the claimed invention.

The specification includes a written description of the invention and of the manner and process of making and using it. A specification must be in such full, clear, concise, and exact terms as to enable any person skilled in the technological area to make and use the invention as it is claimed.

The specification must describe a complete, specific embodiment of the invention and the best mode contemplated by the inventor of carrying out the invention. Models were once required to be submitted with all patent applications. They are not now required except in extremely rare cases, since the description of the invention in the specification and the drawing must be sufficiently full, complete and capable of being understood without the benefits of a model.

A model or other physical exhibit, however, may be required by the Office if deemed necessary, and it may be called for in the case of an application directed to an alleged perpetual motion device.

The patent laws authorize the patenting of any new and useful process, machine, manufacture or composition of matter or any improvement thereto.

The term "useful" refers to the condition that the subject matter in question has a useful purpose, and includes operability. A machine that will not operate to perform its intended purposes is not useful, as is the case with alleged perpetual motion machines. If the asserted utility of an invention is believable on its face to the person skilled in the art, in view of contemporary, scientific knowledge, the burden is then upon the examiner to establish a reasonable basis for doubting the utility or operability of the invention.

On the other hand, statements of operability deemed unlikely to be correct by one skilled in the art in view of contemporary knowledge will require adequate proof on the part of the applicant. The patent statute and longstanding decisions, for example, *ex parte De Bausset,* obligate the examiner to raise the issue of utility or operability in cases in which known physical laws are disregarded.

Ex parte statements or theoretical arguments or in reply to an examiner's prima facie holding of inoperability are not considered

sufficient. The applicant must prove operability with affidavits of experts, applicant's test or submission of a model where required.

An invention, to be patentable, must also be new as defined in the patent law, that is, different from the prior art. Even if a subject matter sought to be patented as not exactly shown by the prior art but involves one or more differences over the most similar prior art, a patent may still be refused if the differences would be obvious to a person having ordinary skill in the area of technology to which the invention relates.

I turn now to Joseph Newman's particular application but must limit myself to a discussion of its chronology. Not all of his application file is publicly available. Parts were made available in the process of a civil action which he instituted, and parts remain subject to the confidentiality obligations imposed by the patent law. Also, it would be improper for me as an official to comment or speculate publicly on the merits of his case now pending in district court.

On August 18, 1980, Mr. Newman filed an application for a patent on his invention of a method and apparatus for obtaining more energy from a machine than is put into it.

This application is related to several earlier filed applications, all since abandoned by Mr. Newman. A patent examiner refused to issue a patent to Mr. Newman based on a determination by the examiner that Mr. Newman's disclosure was not sufficient to permit a person skilled in the technology of the invention to make and use it as required by the patent law.

Mr. Newman appealed the examiner's refusal to the Board of Appeals of the Patent and Trademark Office. In its decision of November 5, 1982, the Board sustained the rejection of the examiner. The Board concluded that while the disclosure in Mr. Newman's application was sufficient to enable one skilled in the art to construct a motor, such a motor would not and could not be made to operate at an efficiency level greater than 100 percent.

The Board appended to its decision a copy of an article from a January 1968 issue of Scientific American, explaining why machines of this type will not work.

On January 3, 1983, Mr. Newman filed a civil action in the U.S. District Court for the District of Columbia, one of the two courts in which the applicant dissatisfied with a decision of the Board of Appeals and Interferences may seek judicial review.

The District Court, on August 15, 1984, referred the matter to a master, former Commissioner of Patents William E. Schulyer, Jr. In draft findings on September 28, 1984, Mr. Schuyler stated that there was overwhelming evidence that Mr. Newman had built and tested a prototype of his invention in which the energy output exceeded the external energy input.

Furthermore, Mr. Schuyler concluded there was no contradictory factual evidence. After Mr. Schuyler's report was filed with the court, the court ordered a second examination of the application by a different examiner in the light of the draft findings of the special master. This examiner also rejected the claims in the application and requested production of a model for testing. These results were forwarded to the court as ordered.

On June 11, 1985, Judge Thomas P. Jackson of the U.S. District Court for the District of Columbia held that the special master's report was clearly erroneous to the extent that it found that there was no genuine issue of fact with respect to the operability of this device.

In support of his holding, Judge Jackson relied, among other things, upon the laws of thermodynamics, a report from the Mississippi State University, and the action of the second patent examiner.

Judge Jackson also ordered Mr. Newman to produce his invention for testing at the National Bureau of Standards. Mr. Newman asked the Court of Appeals for the Federal Circuit to set aside Judge Jackson's order, and on January 13, 1986, the Court of Appeals ordered Mr. Newman to produce his device for testing at the National Bureau of Standards, subject to certain conditions.

Mr. Newman delivered the device to NBS on January 24, 1986, and on June 26, 1986, NBS delivered its report to the District Court, the Patent and Trademark Office, and Mr. Newman. The report concluded that the device does not function as alleged in the patent application. The NBS report stated that, "at all conditions tested the input power exceeded the output power. That is, the device did not deliver more energy than it used." A trial has been set for December 8, 1986.

This concludes my testimony. I would be pleased to answer any questions.

Senator COCHRAN. Thank you very much, Mr. Tegtmeyer. I notice that Congressman Dan Burton has returned to the hearing room. At this point, we will call on him for whatever statement he may wish to make to the subcommittee.

If Dr. Lyons and Mr. Tegtmeyer could just stand aside for a few moments, we would appreciate it.

Senator COCHRAN. Congressman, we appreciate your being here, and we welcome you to the hearing.

Representative BURTON. Thank you very much.

Senator COCHRAN. You are the Congressman who introduced the first legislation in the House of Representatives on this matter. We would appreciate hearing from you.

TESTIMONY OF HON. DAN L. BURTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF INDIANA

Representative BURTON. Well, I appreciate the indulgence of the Senate in giving us time to get over there and vote and get back.

Thank you, Mr. Chairman, for the opportunity to speak in regard to my bill which would grant Mr. Newman a patent by congressional decree. I believe that the Patent Office Appeal Board refused to give Mr. Newman a fair hearing. In good faith, Mr. Newman brought his device to the PTO Appeal Board hearing for a demonstration and for testing, but the minds of the Appeal Board were apparently already made up. They refused to even watch the machine operate and sat across the room in a stony silence.

Mr. Newman then sued in Federal court. The presiding judge appointed a special master to sit through the technical evidence. The special master chosen was hand picked by the Patent Office. He

was a former Patent Office Commissioner. Because of his credentials were so spectacular the judge called him superb.

Mr. Newman's former objections were withdrawn. Eventually, the special master issued a report saying that:

> There is overwhelming evidence that Mr. Newman has built and tested a prototype of his invention in which the output energy exceeds the external input energy. There is no contradictory and factual evidence.

The special master concluded that Mr. Newman is entitled to his patent. Yet at the bidding of the PTO, the judge threw out the report of the special master even though Federal law states that a special master's report is binding unless clearly erroneous. The judge was unable to cite anything clearly erroneous in the report.

He justified his actions by saying that Mr. Newman's device and the theory contradicts currently believed scientific principles, but the special master accounted for this by saying, "Even though the operation of Newman's system seems contrary to recognized scientific principles, Newman has demonstrated the operation of his system by very clear evidence and is, therefore, entitled to a patent."

The viability of Mr. Newman's machine cannot and should not be the central question. The marketplace is the best judge of that. But the marketplace cannot work unless Mr. Newman is granted the legal rights to his own invention.

I really appreciate your holding this hearing. Mr. Newman, Mr. Chairman, has been frustrated, and my office has been frustrated for probably 1 year to 1½ years. Kevin Whitehead on my staff has worked very closely with Mr. Newman to try to make sure that justice was done.

We have talked to the Patent Office; we have talked with the people who were supposed to test this, and the bureaucracy has given Mr. Newman, in my opinion, a runaround from day one. I think he has been very unfairly treated, and he has brought this to the attention of a number of the Members of the House of Representatives.

I think we have about five sponsors of individual bills right now, and if it were brought to the attention of the majority of the House of Representatives Members, I think they would all cosponsor individual bills, but we simply have been too busy to get around to everybody.

But I really appreciate your taking the time out of your busy schedule to hold these hearings, and I am sure Mr. Newman appreciates it, as well.

Senator COCHRAN. Thank you, Congressman. Let me ask you one question. In your research of this issue, have you uncovered any instance where Congress directed the Patent and Trademark Office to issue a patent to an individual?

Representative BURTON. No. No. There have been individual bills introduced in the past, trying to get Congress to act, but as far as I know, it has never been accomplished.

Senator COCHRAN. There is also a statement we have been given from Congressman Robert Livingston of Louisiana.[6] We will include that also in the record.

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[6] See p. 93.

Representative BURTON. If I might add one more comment, the way this was brought to my attention was there was some scientists and television stations that did some research on this down in New Orleans, in Representative Livingston's district. That evidence, I think, was pretty conclusive. They had scientists and engineers from, I think, Mississippi State University and, if I am not mistaken, one of the battery companies here in the United States that did some extensive research on this, and they said that there was evidence that Mr. Newman's machine did work and that was one of the main reasons that my colleagues and I decided to sponsor this legislation.

Senator COCHRAN. Thank you very much, Congressman.

Senator Glenn.

Senator GLENN. No questions right now. I want to get into this in a little bit more detail later on. We have multiple hearings this morning is the problem. I am sorry I could not be here earlier on, but I appreciate your being here this morning. I will have some questions later on.

Mr. BURTON. Thank you, Senator.

Senator COCHRAN. Thank you Congressman, very much. If Dr. Lyons and Mr. Tegtmeyer could return to the witness table, I think we will go forward now and hear from Dr. Lyons. Mr. Tegtmeyer had completed his statement to the subcommittee.

Dr. Lyons is from the National Bureau of Standards, which undertook testing of this machine.

Dr. Lyons, you may proceed.

Mr. LYONS. Thank you, Mr. Chairman. I am accompanied today by my deputy, Sam Kramer. With your permission, I would like him to approach the table.

Senator COCHRAN. He can be here at the table with you and should come forward, now. You can pull the microphone closer to you; that will take care of the need to be heard.

JOHN W. LYONS, Ph.D., DIRECTOR, NATIONAL ENGINEERING LABORATORY, NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD,[7] ACCOMPANIED BY SAM KRAMER, DEPUTY DIRECTOR

Mr. LYONS. I am here this morning to discuss the programs at the National Bureau of Standards on energy-related inventions, and, as a separate matter, our role in testing Joseph Newman's device.

First, let me talk about the Office of Energy Related Inventions. Since 1975, we have participated in the Federal program established by Congress to encourage and support energy-related innovations by independent inventors or small businesses. This program has two parts at no cost to the inventor.

The NBS Office of Energy Related Inventions provides evaluations of inventions and recommends those that it considers promising to the Department of Energy. DOE may provide financial support to the inventor to help in commercializing the idea.

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[7] See p. 97 for Mr. Lyons' prepared statement with attachments.

The program is open to all inventors who believe they have ideas which are technically feasible and would save significant amounts of energy or increase supplies of available energy from nonnuclear sources and have reasonable chances of becoming commercial successes.

Since 1975, we have received some 22,000 applications. About half survived preliminary screening. These are then put through a two-stage evaluation process. Nearly 2 percent pass through the entire process and are recommended to DOE for support.

DOE has awarded grants totaling more than $16 million for 234 of the 358 inventions we have recommended. At last count, some 46 inventors have been able to acquire approximately $46 million in follow-on financing, mostly in private non-Federal sources. Apart from the financial assistance offered through the program, inventors whose ideas survive the process receive a measure of credibility and often can take an idea to banks or venture capitalists to obtain additional support.

The Office of Energy Related Inventions does not test individual inventions. This settlement is made clearly in all of the OERI literature. Obviously, considering the large number of requests for evaluations that we receive—as I said, over 22,000 since it began—we could not afford to operate as a testing agency for inventors.

We do, however, often make recommendations about the kinds of tests which might aid an inventor. Occasionally we suggest testing or evaluation laboratories which might be willing to perform the tests. I have further information about the program which, with your permission, Mr. Chairman, I will submit for the record.[8]

Senator COCHRAN. We appreciate having that, and it will be included in the record.

Mr. LYONS. Thank you. Now I would like to address NBS's involvement with Mr. Joseph Newman. Our first contact with Mr. Newman was in September 1975, when he submitted an evaluation request to the Office of Energy Related Inventions. Over the next several months, OERI advised Mr. Newman several times that we need additional information—specifically test data and an explanation of how and why the invention works since his claims ran contrary to well-established scientific principles.

OERI did not receive such information. In early October 1982, OERI was advised by the Department of Energy that Mr. Newman had brought a prototype device to Washington, DC on his own initiative. OERI indicated that Mr. Newman was welcome to visit NBS to discuss his invention with an evaluator.

Mr. Newman then arrived at NBS with his device and asked OERI to test his invention. Our staff affirmed the OERI policy of not performing laboratory tests on individual inventions.

To assist Mr. Newman, OERI put him in contact with a member of the Auburn University staff in order to help him have the device tested at a place relatively close to Mr. Newman's residence.

At DOE's request, OERI agreed later that month to process Mr. Newman's request. After review, the invention was rejected in De-

[8] See p. 193.

cember 1982 since neither the required test data nor explanation of operations were provided by Mr. Newman.

Over the 1½ years, OERI corresponded several times with Mr. Newman's attorney about his client's evaluation. The OERI file on the Newman device shows no further actions.

Subsequently, Mr. Newman and the U.S. Patent and Trademark Office came before the U.S. District Court in Washington, DC, as discussed by Mr. Tegtmeyer today. As part of the proceedings, the Patent and Trademark Office in late 1984 asked the OERI to conduct laboratory measurements on Mr. Newman's device to test the claims that his device would produce more energy than it used. Because NBS had a clear mission to conduct research for other Federal agencies, in December 1984 we agreed to conduct such tests for the Patent and Trademark Office. The testing was to be performed by the NBS Center for Electronics and Electrical Engineering, which is well equipped to make electrical measurements. No staff of the NBS Office of Energy Related Inventions was involved with these tests.

After a series of legal and technical issues regarding the conditions for testing were addressed in several court proceedings and orders, the device was delivered to the NBS on January 24, 1986. Mr. Newman came to NBS on February 10, 1984, to make sure the device was ready for testing.

With the court's permission, we began preliminary measurements on March 11, 1986, and then prepared a complete testing plan. Mr. Chairman, I also have a copy of this test plan, which I would like to submit for the record.[9]

Senator COCHRAN. Thank you. It will be included in the record.

Mr. LYONS. After submitting that plan, we received permission from the court to proceed with the tests, which were conducted between late March and early June 1986. A report on the testing and findings was submitted on June 26, 1986, and made part of the public record by the court. That report is in my official written testimony.

Under all conditions tested, the input power from the batteries running Mr. Newman's device exceeded the output power from the device. That is, the device did not deliver more energy than it used. A copy of our report has been submitted.[10]

I would like to emphasize the following points about our tests.

The electrical characteristics of the device required NBS to combine a variety of instrumentation in order to conduct valid tests. Improper equipment would give inaccurate results.

We did not invent any special equipment or computer programs to conduct the tests. All of the devices we used had previously been used by NBS.

NBS conducted the test using the information supplied by Mr. Newman regarding his device's operation. We conducted the tests following a test plan which had been submitted to the Patent and Trademark Office and by that agency to the court and to Mr. Newman before the tests began. The Patent and Trademark Office

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[9] See p. 212.

[10] See p. 225.

invited Mr. Newman to witness the tests, but he did not attend any of them.

Our results are clear and unequivocal. They are explained in detail in our report. Thank you, Mr. Chairman. I would be happy to answer any questions you might have.

Senator COCHRAN. Let me ask you this, Mr. Tegtmeyer. To your knowledge, has the Congress directed the Patent and Trademark Office to issue a patent to an individual in the past?

Mr. TEGTMEYER. To my knowledge, Mr. Chairman, the Congress has not directed the Office to issue a patent to any individual in the past. I certainly believe that is a correct statement for more recent years; it is the best of my knowledge for prior years, as well.

Senator COCHRAN. Let me ask you this further question. In the handling of the application of this patent from Joseph Newman, did the Patent and Trademark Office follow its usual procedures or were there any special variations in the way in which this application was handled?

Mr. TEGTMEYER. This application was handled just as other applications are. We conduct an examination and look at questions of utility; compliance with the statute in regard to completeness of disclosure, including the operability of the invention as claimed; novelty; and the unobviousness of the invention.

Those are the principal issues reviewed in all applications and were reviewed similarly in the Newman application.

Senator COCHRAN. One of the witnesses who has introduced legislation in the House directing that the patent be issued said that one reason was given on one occasion and then a different reason was given on another occasion by the Patent Office as to why it didn't issue the patent.

In one instance, I think Patent and Trademark Office said it doesn't work; in the other instance said: "Well, it works, but it wasn't described adequately."

What is the reason the Patent Office has refused to issue the patent?

Mr. TEGTMEYER. I think the reasons why the Office has refused to issue a patent are stated in the rejections that were made by the two examiners that examined the Newman application and by the Board of Appeals in its decision on appeal from the first examiner's final rejection.

Those are the reasons. The written reasons are stated in the record in writing and identify that the invention will not operate to perform as claimed; that is, to produce more output energy than is consumed from externally applied input energy.

Senator COCHRAN. Dr. Lyons, in the testing of the energy device, you are saying to the committee that the National Bureau of Standards undertook to determine whether or not the machine would work and found that it didn't; is that correct? Is that the essence of your testimony?

Mr. LYONS. That is the essence of our testimony; yes, sir.

Senator COCHRAN. Senator Glenn.

Senator GLENN. Yes, thank you, Mr. Chairman.

There have been a number of complaints made by Mr. Newman and Mr. Hastings about your test or the methods of test of this

device. I wanted to explore those very briefly here and get your response for the record.

Mr. Hastings said you should have tested the machine as a motor rather than a generator. What is your response to that?

Mr. LYONS. The machine submitted to us, Senator, was a generator. It was indicated as such in Mr. Newman's own publication. We indicated in our test plan we were going to test it that way, and there was no objection raised.

Senator GLENN. Would you have any reason to believe that if the machine were reconfigured as a motor that the output power at the shaft would be greater than the electrical input power?

Mr. LYONS. I have no reason to believe that, no.

Senator GLENN. Much has been made about the ground connections of the machine, the shunting of radiofrequency power to ground, thereby reducing the net output power of the machine. I guess the first question would be: Why do engineers ground one side of an electrical circuit when making measurements?

Mr. LYONS. Normally, we ground circuits so as to know what the reference plane is. Whenever you measure a voltage, you have to take some arbitrary zero ground point, and the ground provides that reference point.

Senator GLENN. What would happen if you did not do that?

Mr. LYONS. Well, it is possible nothing would happen, and in other cases, it is possible that you would build up, say, an electrostatic charge or another source of potential and the results would begin to float.

Senator GLENN. Why was the ground connection made, to get that zero reference point?

Mr. LYONS. To make sure. We normally would do that.

Senator GLENN. Did the original schematic you had show a ground connection?

Mr. LYONS. The test plan shows ground connections, yes, sir.

Senator GLENN. Did Mr. Newman or Dr. Hastings have access to the National Bureau of Standards test plan for this device in advance of the test?

Mr. LYONS. We submitted the test plan to the Patent and Trademark Office. It is my understanding it was submitted from the Patent and Trademark Office to the court and to Mr. Newman's attorney.

Senator GLENN. Were there any objections raised to the plan?

Mr. LYONS. We are aware of none.

Senator GLENN. Thank you, Mr. Chairman.

Senator COCHRAN. Thank you, Senator. Let me ask you this. If the device was not tested in a way that was requested to be tested by Mr. Newman, would that invalidate the test in your judgment?

Mr. LYONS. Would you repeat that again?

Senator COCHRAN. If the test wasn't conducted in a way suggested by the inventor that it should be tested, would that invalidate the results, in your judgment?

Mr. LYONS. Well, let me take a different tack. We looked at the device; we made preliminary tests. We decided on a proposed way of testing it and submitted that back to Mr. Newman's attorney for comment. Mr. Newman did not indicate to us precisely how to test the machine.

Senator COCHRAN. Thank you very much for your testimony and for being here. We will now turn to our next panel of witnesses.

Senator GLENN. Could I ask one additional question?

Senator COCHRAN. Certainly.

Senator GLENN. Was there any reason why Mr. Newman was not there during the test? Did he request to be there and was refused, or did you ask him to be there and he refused or normally, in a test like this, would the inventor not normally be there to comment on it?

Mr. LYONS. Senator, let me say that it is very unusual for the Bureau of Standards to run any tests on instructions from a Federal court. In fact, in my experience, this is the only time. Part of the court's directions to the Patent and Trademark Office, and therefore to the Bureau of Standards, was that the inventor, his representative, and an attorney could be present during the testing.

So we are required to notify as to when testing was to take place. We did so early in the testing process; we gave several days notice, and then finally, I think, gave a continuing notice that from then on, every day we would begin testing at such and such a time and to continue throughout the day. So we feel more than adequate notice was given, and they were free to come.

Senator GLENN. And they just didn't show up, or they told you they wouldn't be there?

Mr. LYONS. They did not come.

[Subsequent to the hearing Mr. Lyons submitted the following letter:]

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

August 8, 1986

Honorable Thad Cochran
Chairman, Subcommittee on Energy,
Nuclear Proliferation and Governmental Processes
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

At the July 30, 1986 hearing before your Subcommittee on the Joseph Newman device, several statements were made by other witnesses that require correction as to matters of fact. I submit the following for the record.

1. Messrs. Flannery, Newman, Hastings, and Everett all criticized the NBS testing because of the manner in which the device and the test instrumentation were connected to electrical ground. Mr. Flannery indicated that he had given contrary advice to NBS. I discussed this, in part, at the hearing in response to questions from Senator Glenn. I had, in my oral testimony submitted for the record a copy of the NBS test plan. It is clear that the NBS test plan, submitted to the Court on March 20, 1986, and given to Mr. Flannery on March 21, 1986, contained, as page five, a schematic of the planned test set-up. On this schematic the electrical grounds are unambiguously shown. No objection to the test plan was raised by the inventor or his representatives until after the NBS report was released some three months later.

2. Mr. Hastings in his testimony discussed at length reasons why NBS' testing of the Newman device as a motor was done incorrectly. In fact the device was not tested as a motor because NBS did not receive a motor for testing. We received a device which converts direct electric current into a form of alternating current. The only mechanical aspect of the device was the commutator, the shaft of which was not fitted for taking off mechanical power. The NBS test plan (see 1. above) clearly states on page one that "the following test plan treats the device as a generator." No objection to this aspect of the plan was raised by the inventor or his representatives until after the NBS report was released some three months later.

3. Mr. Flannery stated that he and his client were not afforded the opportunity to be present during the tests and gave as examples two instances in June 1986. In fact this was at the very end of the laboratory testing. We began testing in March and gave advance notice at least twice formally by mail and also by telephone. The right of Mr. Newman and his representatives to attend the tests was ordered by the Court before testing began and was reaffirmed again on April 11, 198[illegible] before the Court. Mr. Flannery was informed by letter on March 19, 1986 that testing would begin on March 26, 1986 and that "testing will continue from day to day until complete".

4. Mr. Flannery alleged that $100,000 appropriated for the purposes of the energy act(?) was misappropriated to fight a patent case. Other than small sums used by the Office of Energy Related Inventions (OERI) to process Mr. Newman's application for evaluation first in 1975 and again in 1982, no money appropriated for implementing energy legislation has been used by NBS in this matter. The cost of the testing performed by NBS in 1986 is being billed to the Patent and Trademark Office.

5. Mr. Newman incorrectly attributed to Dr. Hebner of the NBS staff a remark made by NBS' Mr. Rabinow. This is important since Mr. Rabinow was offering his expert opinion to the OERI and had nothing whatsoever to do with the later testing by Dr. Hebner. Mr. Rabinow's name was introduced repeatedly into the proceedings before your Subcommittee by Mr. Newman and his representatives. Mr. Rabinow has undertaken to correct the record on his own behalf in a separate letter to the record.

Thank you.

Sincerely,

John W. Lyons, Director
National Engineering Laboratory

cc: Honorable John Glenn
Ranking Minority Member

Mr. TEGTMEYER. Senator Glenn, in further response to your question, I might note that the Office, to my knowledge, has not conducted similar tests of this kind. In cases of this nature, we rely upon affidavit information submitted by the applicant to make an evaluation as to whether an invention has utility or is operable in accordance with the patent law.

Senator GLENN. I understand. Thank you.

Senator COCHRAN. Thank you very much. You may be excused.

Our third panel of witnesses includes the inventor, Joseph Newman; his attorney, John Flannery; Dr. Roger Hastings, senior staff scientist from the Sperry Corp.; and Mr. Milton Everett, mechanical engineer from the Mississippi Geological Department of Jackson, MS.

We welcome each of you to the hearing. We have statements, all of which will be made part of the record in their entirety. At this point, we would encourage you to make summary comments or abbreviated comments from those statements so we would have an opportunity for a discussion of the issues that you raise.

Mr. FLANNERY. Thank you, Senator.

Senator COCHRAN. We would like for John Flannery to proceed first, if you will to outline for the subcommittee the information you have about the application and the way it has been handled and your suggestions for the appropriateness of congressional action. You may proceed.

TESTIMONY OF JOSEPH NEWMAN,[11] INVENTOR, LUCEDALE, MS, ACCOMPANIED BY JOHN FLANNERY II,[12] ATTORNEY, WASHINGTON, DC; ROGER HASTINGS, PH.D.,[13] SENIOR STAFF SCIENTIST, SPERRY CORP., BURNSVILLE, MN; AND MILTON EVERETT,[14] MECHANICAL ENGINEER, MISSISSIPPI GEOLOGICAL DEPARTMENT, JACKSON, MS

Mr. FLANNERY. Thank you very much for this opportunity to appear. This is the first hearing that we have had in this case since Mr. Newman began his fight 6 years ago when he filed his patent application.

It comes as a surprise to me, as it may to members of this subcommittee, that the Patent Office, which I presume exists to stimulate creativity, does, in fact, the opposite. It is an office that loses—and admittedly so in 1983—1.75 million documents, and frequently—and I submit that Mr. Newman's case is not the only instance—acts as a bar to those who have creative minds discouraging the use of their creative minds and denying them protection for the fruits of their labors. Mr. Newman, I submit, is just one case in point.

The case of Newman serves as an example, and I do refer the subcommittee to the statement I submitted, as I am sure you are going to consider the other statements, but Mr. Newman, at the very threshold of the Patent Office, met an examiner who was not

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[11] p. 107 for Mr. Newman's prepared statement.
[12] p. 110 for Mr. Flannery's prepared statement with attachments.
[13] p. 158 for Mr. Hasting's prepared statement with an attachment.
[14] p. 163 for Mr. Everett's prepared statement.

qualified to consider the patent applications. This is not just our opinion. This is the opinion of a Federal district judge in Texas.

Notwithstanding the testimony you heard moments ago, the Patent Office disregarded its own procedures, and this is our opinion shared by former Patent Commissioner Major William Schuyler who, since he issued patents, is in a position to know whether or not they, the Patent Office, abided by normal procedures.

The Patent Office, on November 5, 1982, did, by its Board of Patent Appeals—say that Joe Newman's machine was impossible. However, former Patent Commissioner Schuyler who reviewed that finding and who was more likely to be concerned about upholding the reputation of one of his former examiners as he had an interest in the system nevertheless impartially reviews the device and he found that the machine worked; that there was overwhelming evidence that it did; that there was no contradictory evidence; and that as a matter of law, though a special master's opinion on the subject of law—as opposed to fact—is not binding on a Federal district court, concluded that a patent should issue for Joe Newman's device.

It is ironic, coincidental, or whatever, that when the final decision denying Newman a patent came down from the Patent Office on November 5, 1982, that 4 days later on November 5, 1982, an NBS official by the name of Jacob Rabinow expressed an opinion without having tested the device or anything else. He said, "I can confidentially predict that the motor efficiency—" that is, of Mr. Neman's machine, "—would be quite low and if all the measurements were done correctly, my guess is that the efficiency would not exceed 10 percent, but this I would not tell the inventor."

This "confidential" opinion, made without any tests or observations, is I suppose, also part of their "clear mission to conduct research"—from the statement of the National Bureau of Standards—occurring as it does within 4 days of the Patent Office, their sister agency, deciding that Joe's machine, Joe Newman's machine, was "impossible."

The court, that conceded it was technically incompetent to consider this matter, appointed a special master, former Commissioner Schuyler, who drew these conclusions, favorable to Newman and then, after having obtained his opinion, the court cited a body of scientific knowledge he concededly didn't understand to set aside the master's findings as clearly erroneous.

Incidentally, when Special Master Schuyler considered the evidence, the "contradictory evidence," and decided there was none, he considered a statement by this same NBS official, Jacob Rabinow, who having failed to test the device, said that it didn't operate.

Another correction. I am sure it is an oversight. The Patent Office in their prepared statement refer to the master's report as "a draft." It was not a draft. It was a final report, and Joe Newman can tell you, because he paid the tab for that report and the fees and the expenses, the report that was ignored by the court, the report that was ordered over Newman's objection by a master who was nominated by the Patent Office, chosen by them, and I don't know if they expected they were going to get a different opin-

ion, but they certainly were unhappy with the consequence that obtained.

The NBS, although it already said it didn't believe that Joe Newman's device operated without ever testing it, was then appointed by the court to test the device. When you read the Patent Office's testimony submitted to this committee, it sounds like there was just some technical or legal objections to this test. That was not the case.

The district court ordered the NBS to run tests at which Joe Newman could not appear; that were not limited in duration; that might not conclude with any written report as to what test they, in fact, ran; and that provided that the Patent Office could destroy Newman's device. In essence, the Patent Office and the NBS could destroy the evidence of what it was they "tested" and thereby provide that nobody may compare any further results with what they had obtained.

I don't think that is a "mission" of research, and, in fact, we petitioned the court of appeals on that question, and the court of appeals decided that this testing procedure was unprecedented; that the "aura of impartiality" of a national laboratory had been rebutted by the evidence of their conduct, their past conduct in this case; and they said that those testing conditions as ordered weren't fair.

The court of appeals found that the district judge had denied Joe Newman fundamental fairness, and they set aside his order and set their own procedures permitting Newman to be present, limiting the duration of the tests to 30 days, prohibiting the destruction of Newman's device, and requiring NBS to issue a report within 30 days of the delivery of Newman's device. Thirty days was still a burden for us, but it was a fair compromise. Our perspective was, "well, we consider it a level playing field." It is under those circumstances we produced the device.

Even as we were producing Joe's device, because we figured then by these court-ordered procedures we could—at a trial or in a proceeding like this—be in a position to have the evidence to test NBS's credibility. And we had every reason to question their credibility by that time. Even as we were producing Newman's device for testing at NBS, Mr. Hebner of NBS. . . . And you don't see him in the room today. Because if he was here, he might have to answer direct questions. The Patent Office view is: "We don't want to hear anything from anybody who had anything to do with this."

Mr. Quigg didn't appear. My client didn't file a false affidavit, as Deputy Solicitor Jerry Sears of the Patent Office did in the court. We don't have Mr. Hebner of the NBS, who ran these tests, who made these tests, who submitted a false application to the court of appeals implying Joe Newman's machine was "a hoax." "No, we don't want to have anybody here who can actually testify about what happened" but we did.

Again, we don't have Mr. Flannery saying that is what the Hebner affidavit meant. It was the court of appeals that said that the "thrust" of Hebner's affidavit before he tested Newman's device was that Joe Newman's machine was "a hoax." This is, again, the impartial laboratory, the National Bureau of Standards, which I presumed, before I came into this case, meant something was what it appeared to be, impartial. This national laboratory,

before it runs a single test against the background of Rabinow's negative criticisms, is submitting an affidavit in the court of appeals suggesting Newman's device is a hoax.

They say we told them how to run the tests. It is not true. NBS and the Patent Office asked us how to run the tests. We said "We wouldn't tell you. You asked for the test," we said, "So you decide your own test, but we will tell you how we ran the tests before."

Senator Glenn, you referred to the schematic. We submitted a schematic to them of what tests we had run before, and in that schematic, there is no ground connection. I believe a member of your staff is an electrical engineer. The language of schematics is "what it says is what you do."

The schematic of their final test has a ground, and Roger Hastings is much more qualified to explain why, as is Joe Newman, why in this configuration, Joseph Newman does not do that. But if we gave them any direction at all from our past tests, it was that, "You do not under any circumstance connect a ground to test the particular prototype we are giving you," as evidenced by the affidavit of Roger Hastings, including the schematic that did not connect the device to a ground.

They ignore the fact that the court of appeals order that issued said two things: One, 30 days to test; two, notice of the tests. Well, I heard some statements here that I didn't object to the test plan they gave me. The test plan they gave us was nothing more than a schedule after the 30 days saying that they were going to run tests for 90 days from 8:30 to 5:30 every day, consecutively. Not I nor Mr. Newman nor his expert could possibly afford to be there every day, that duration, and observe the tests.

We asked that the tests be open, so that even if we couldn't appear, whatever people are in this audience or elsewhere in this Nation that might want to attend could be there to see what happened and then put us in a position to criticize what they did. But they wanted it private then. They didn't want it public until they had this report that said what they wanted it to say.

They talk about the notice that we got. Well, first of all, we insisted we be there all the time. We didn't want them to select which tests we could know about when we could appear. That was the point of the court of appeals application, that we be present at all the tests. So they would give me a note of select tests. They did this on two occasions: They told me at 10:30 on June 2, for example, that, "On June 3, at 9:30, we are going to run tests."

Mr. Newman is in Lucedale, MS; Roger Hastings is in Minnesota; and as it happens, on the very day they are notifying me, I have something else to do, and it is only one test out of 90 days of tests, and they are selecting which one which I should be there for . . . this show. That is not notice, not by any standard that I understand.

The irony is that as a result of failing to comply with the court of appeals order, they ran past the 30 days. In fact, they had the machine 120 days. They didn't give us notice of why they ran tests with the schematic connected to ground and these other things so that we would be in a position to say, "That schematic is wrong; that is not the way you test this device."

That is my notion of notice. You show me the schematic and the test you are going to run, and I say to you, after consulting with my expert, "That doesn't make any sense." But we never got that notice. As a result of their failure to conform with our past practice and to give us notice, they ran the tests wrong. Now they are trying to say that we told them to do it that way.

It reminds me of some of these game shows I saw as a child.

Well, unlike our compatriots in the Government, we have brought the people who know about what happened. I also have with me: [18]

One, the statement of Jacob Rabinow which he expressed about the invention in 1982, "Don't tell the inventor of my opinion;"

Two, the report of the special master that says what I have said to you;

Three, the court of appeals opinion in January 1986 saying "test for 30 days and give them notice as what you now propose is fundamentally unfair"; and

Four, I have the declaration of Robert Hebner and the exhibit.

NBS expert Hebner, in his sworn declaration, referred to an article, "I, Fraudulous." It is an article by a self-proclaimed fraud telling how he made a perpetual motion machine. This is what Hebner submitted to the court of appeals before they ran a single test.

Five, this is the court of appeals' opinion in which the court says the thrust of Mr. Hebner's declaration is that Newman's device is a hoax.

Six, then I have the letter from Mr. Hebner, who is not here today, in which he asked me for a wiring diagram of the device under test.

Seven, and we have my response, January 30, 1986, in which I tell him, "NBS has had the wiring diagram and a description of the device, again at pages 36 to 39," and I attached to this letter to Hebner a copy of the schematic that shows that you do not connect to ground.

Eight, I have the test plan that they gave us. You can thumb through this and see if there is any schematic anywhere in it, but that was the test plan.

Nine, and then we have in the statement of Roger Hastings, we have a copy, and you have it in their testimony, of the schematic they used in which they do connect to ground.

Evidence, evidence is the reason the Congressmen have introduced private patent bills. It is the reason they came here, and although they—the Patent Office—imply that these Congressmen don't know what they are doing, the Congressmen have reviewed these facts. Every time they question the Patent Office or the NBS, those people have come up wanting on evidence to support what they are saying. That is why we are here today.

One of the members of the staff asked me yesterday if we couldn't take the energy from out of Joe Newman's device and turn it around and somehow push it in input, and I said, "Well, that is what they have been trying to do to Joe Newman, but he can't do it with the device."

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[18] See p. 118 for exhibits 1 through 9.

I submit that the Congress has, in the past, extended the life of patents, and then in this case, as it has in the past, involved itself both by private and by public bills to do that, and as it has the residual power from the Constitution to promote science by such patent protection, that this committee should, after hearing the remaining evidence and testimony, commend to the judiciary committee and perhaps the full committee the introduction of a private patent bill and, indeed, I think a full investigation of how $100,000 of Energy Act money for nonnuclear research has been misappropriated to fight a patent case, litigation, which moneys are only designated for promising devices.

The National Bureau of Standards and the Department of Energy are all on record, indeed, by the testimony today, as believing that this device doesn't operate.

I am sorry that probably my Celtic forebearers have encouraged me to go on too long in my opening statement. For that I apologize.

Senator COCHRAN. We appreciate your presentation, and copies of the documents you have and which you have described will be included as an appendix to your testimony.

Let's now hear from Joseph Newman. If you have any comments or presentation to make, you should feel free to make those comments at this time.

Mr. NEWMAN. First I would like to thank the Senators for having this meeting. This is the first time I have had an opportunity to speak to any matter that I consider honorable, that I consider in the essence of what the Patent Office is about. I will try to keep my anger down, because I am boiling over. When I see in front of a courthouse a woman blindfolded holding out scales of balance, that touches me, and what I see in justice makes me boil like a damn tornado.

I am not fighting just for Joe Newman. Most people think Joe is getting mad for himself. I am not. You fight harder when you fight for other people. What I have seen is an injustice that goes against what this country is founded upon. Always from the basic time that I walked, I have been inventing for 25 years for a living. I have never had this problem before.

I have all my business cards. If it can't be done, it interests me. I have never met a man, I have never met a woman who I thought who could out-think me mechanically. I have that challenge when I am consulted.

When your engineers can't solve it, you call me. If you can solve it, don't waste my time.

I make a nice livelihood doing that. I spent 25 years of my life and of my moneys doing scientific research and development. What I have seen take place here on this invention is something that concerned me. Let's say, for example, that Joe Newman has what he says he has, let's say 20 years from now, and say Joe Newman doesn't get one dime for what he has done, and he has devoted 21 years of his life to this invention, and its 20 years later, what are you all? Say you are young men graduating from college or young women graduating from college.

Let's say you get a creative thought and you have seen all the tremendous changes that I know are going to occur, and I know

they are going to occur, phenomenal changes for the benefit of humanity. A young person sees that, and he knows Joe Newman didn't get a dime for 21 years of his life. And that young person then thinks, I have a tremendous idea, and then thinks for a moment about pursuing that, and they think it may take them most of their young life, as my work has carried most of my young life.

Question: Would they pursue it if they thought the same thing would happen to them that has happened to Joe Newman? The odds are, they would not. Let's say Joe Newman has drawn the line. I have seen an injustice, and I am saying I want to fight that injustice. I want to fight it vigorously. The people who founded this country would want to fight it vigorously.

Let's say that the patent law is changed, not for Joe Newman, but for future generations of young people yet to even be born, and they know that because that Joe Newman fought so vigorously, that the patent laws have ferocious teeth; that if this type of injustice ever tries to happen again, those people involved in that would be gobbled up.

Then that young person would pursue that and benefit humanity. You stifle creativity, and you have stiffled advancement of the human race. That is what I fight. Again, most people don't fight like I fight, and I understand that. I have got a bulldog attitude.

It is just like when you read the Constitution. What it says, Congress will see to it the creativity of the individual is stimulated by which influence the inhabitants and the nation benefit. It doesn't say that person has to have a bulldog attitude; it doesn't say that at all. It just said they have to be able to contribute to humanity.

The jewel of our civilization is our creative people. Everything we have at our fingertips have been put forth by some caring person from the past history of the world that cared enough to bring these things forward, and you protect the jewel of the civilization.

From the time I walked into the Patent Office with this invention, I was kind of horrified, because I have been inventing a long time, and I have never seen examiners act this way. And I expected them not to believe that, and I sent seven affidavits of operability. I sent letters concerning my honesty and integrity of business people that have known me for years, and I have very unusual honesty and integrity.

The examiner immediately called it an "alleged device," that he didn't believe it. He said: "You are running on a mere 99 milliamps and 100-and-some-odd volts."

He wasn't concerned about 100-and-some-odd volts; a lot of things run 110 volts. He was concerned about a 400-pound rotary that was going to run off what he called a mere 99 milliamps. He said I possibly had a hidden energy source.

He says, relative to the affidavit on operability, he wasn't going to accept them and relative to the other affidavits concerning my honesty and intergrity, my honesty and intergrity wasn't in question.

It most certainly was in question, because he called it an alleged device and called it running off a mere 99 milliamps. If that isn't questioning my honesty and integrity, I don't know what it is.

I wrote to my Senators and Congressman asking for assistance. I think it was Congressman Trent Lott who really got them to call a meeting on this, and when I met with the examiner he told me something that really shocked me. And he said it not in a mean animosity, just in a matter of fact way. In fact, it was kind of set up by his supervisor, Miller, who said: "Whenever we get a device like this, we always give it to Mr. Dugan, because he has never given anybody anything." He said: "Yes. In fact, yes, I don't think I will be able to give you a patent no matter what evidence you give to me."

I didn't challenge him, but I was amazed. I mean, this is the Patent Office. The whole essence of you getting a patent is if you can find it written and disclosed in any article within 1 year from the time you have filed for a patent, it is not patentable. So you, the whole essence of what he was looking at it was backward. He was saying: "Because I can't find your information in a book, I am not even going to look at it." totally opposite of what the dictates of the patent law is.

He kept asking me: "Where? Where does this energy come from?" Now, I knew that the man had not read a disclosure document that took me, dedicatedly, 17 years of my life. I wrote to President Johnson about this in 1967 predicting that this invention was going to come forward making an oath that I would not be satisfied with myself until I had put forth this invention and a merger between mechanization and economics.

I have written every President in office since 1967 predicting this would come forward. I wrote to Reagan telling him it was done, asking him for assistance. My Government hasn't given me one dime, but it has consistently caused me to spend over $400,000 of my mine to bring this invention forward.

I find it kind of ironic that, in World War II, Fermi, under the football stadium in Chicago, had over 400 tons of material and produced less than a quarter of a watt in chain reaction. From that simple demonstration, primitive demonstration, our Government put forth billions of dollars, thousands of people to destroy life and property.

This invention of mine is not an accidental discovery. It is a dedicated effort that carried me over many, many years of my life in a dedicated way. Other inventions I have worked on are like toys to me. I solve them left and right, and other people are amazed how quick I can solve these. I have more than 21 years of my life in this book.

I put forth a unified field theory on mechanical engineering, planetary motion, mass, gravity, and energy. In this book I have got letters from every department of our Nation, the Atomic Energy Commission, National Science Foundation, National Bureau of Standards, every department, stating they were unqualified to debate with me my technology.

In the National Bureau of Standards, Dr. Lyons was saying that they are very qualified. I would like to read a letter from Mr. George P. Lewis, Chief, Office of Energy Related Inventions from the National Bureau of Standards. This is January 28, 1986:

DEAR MR. NEWMAN: Unfortunately, you have had difficulty in getting your material published in a scientific journal. However, the Office cannot comply with your

request and use its influence to get your ideas published. We are not in a position to endorse or repute your findings since I stated in our previous letter it is not our function to make judgments about new theoretical propositions which challenge accepted theory.

This was the same document that the Patent Office would not read.

The document took me 17 years to write. I had submitted it in 1979. Now, the examiner told me he had not read it. He said: "Yes, I can remember seeing that thing. I don't have time to read stuff like that."

That is a violation of the patent law. The gentleman from the Patent Office who was speaking up was saying what the Patent Office was supposed to do. What he left out was that an examiner, on taking up a patent application, will make a thorough study thereof.

How can he judge you if he is not going to listen to what it is you are trying to tell them? He can't judge you. He readily will tell you: "I am not going to read your information, but I want to know where this energy is coming from."

That is why I said he was biased and prejudiced going into this.

These are the people who were saying that they are so qualified. I was in New Orleans at the Superdome. I had a nationwide challenge, a nationwide challenge from CNN to put it out to news media. I challenged any Ph.D. from a major university or corporation anywhere, and that challenge still stands. I challenge any man, I challenge any woman to get up anywhere, anytime in front of the public with me and debate the basics of electromagnetic engineering.

I didn't get one taker. I was in the Superdome for 1 whole week, not one person would challenge it. I had over 8,000 people attend that. I would ask them something. I would say: "In 15, 20 minutes, I am going to convince you that this invention works as I say it does. You know why I can say this? It's simple. Truth is like a high intensity laser beam and it will burn through garbage."

I would make those statements and go through the demonstration and ask who believes it: "How many of you people believe this invention works as I say it does? Let me hear from you." There would be a tremendous roar of applause. The people knew I was talking for them, not for Joe Newman. This invention is for them, it is for your children, and their children's children.

That is what I fight for. That is why it makes my blood boil when I see the injustice that I have seen. I am sensitive of other people's feelings, and I am a fighter. I fight like a wildcat. I am sensitive that other people can't do that. They don't have to do that. They shouldn't have to do that. The Patent Office has only one position of existence, just one: To stimulate creativity. What I have seen consistent is what the Patent Office has violated that, even the attorneys who represent the Patent Office, they consistently try to protect the employees of the Patent Office, not the legal position of the Patent Office, but the employees of the Patent Office.

Milton Everett will be testifying in a moment, and I saw them accuse him of spinning up a magnet at my home, and he was there with people from Mississippi State to observe testing. So they ac-

cused him of going out and spinning up the magnet, which is totally ridiculous. He was there as an unbiased individual checking. In fact, Milton came, when he first, he thought he could submit me down over the phone; he will tell you he thought he could. He came down and ran tests.

Their whole position has been one of trying to discredit anyone, even their own master that they nominated after you state into evidence, I have had over 30 scientists state this invention works. They come to my home and listen to my technology, as a good scientist should. How can you judge a person on old art if you are not going to listen to their new art? You can't, you can't objectively judge that individual.

These 30, better than 30 scientists who came to my home I have the greatest respect for, humanity should have the greatest respect for. Because they spoke out at a time when it wasn't the thing do, and they were all sensitive what they were doing, and they were looking at a new source of energy, of converting mass into energy, not a perpetual motion.

I have never stated or implied this is a perpetual motion device. It converts mass into energy on a proven scientific principle of $E=_{mc}{}^{2}$ that the energy in a magnetic field is the mechanical essence of Einstein's equation of $E=_{mc}{}^{2}$. Those people would listen to me.

I say at the beginning: "Don't blindly accept what I say. Challenge me. I ask you to do one thing, just as equally challenging what you have been taught: Run your own tests."

They ran the tests, signed the affidavits. The master gave those men the credit they were due. He said the evidence was overwhelming the invention worked and there was no contradictory factual evidence, and he had to listen to the biased, prejudiced opinion of the National Bureau of Standards expert, Rabinow, who stated, "in his opinion, because my device did not use an iron core tightly coupled with a close coil that it should be highly inefficient when used as a motor."

Now, the scientific method is simple. You let the facts prove or disprove the theory. One of the things I am going to demonstrate when we leave here is that I have a motor. I don't have an iron core coupling in it, and after the National Bureau of Standards had finished their testing, they made another statement to the news media: "Joe Newman's machine is highly inefficient, from 26 to 76 percent efficient."

So they picked a fan and said: "If you want to run a fan, don't use the Newman device, use a copper wire. That is about 100-percent efficient, just a conductor. You will get the electrical source and run the fan."

I am going to do exactly what they said to do. I am going to run a fan, 16-inch fan blade. The motor that I chose has on the box, highly efficient, precision built motor. I will put close to the same amount of wattage in both of them, and there will be a tremendous difference like they said, there would be a tremondous difference.

There will be a tremendous difference, but the difference will be totally opposite of what they predicted, not just opposite, extremely opposite of what they predicted, and the scientific method is simple. You let the facts prove or disprove the theory. Not biases,

not biases, not prejudices, but the facts. The impact of this invention, Senators, is something that is going to change this world in a most beneficial way.

The thing that I am hopeful to see, what I have seen at the National Bureau of Standards and the Patent Office do is consistently lie. I looked at the information my attorney brought me last night that was submitted on behalf of the Patent Office and the National Bureau of Standards.

It is obvious to me what these people do is lie. That they think they have such a high position, that because of who they are the Senators, the news media, and anybody else is just going to blindly believe what they say. What they think and hope you won't do is look at that thick pile of facts in the PTO and court records; that Joe Newman, I knew that this was happening, and I sensed it, and that file is that thick because I put the facts in there.

John Flannery, he is not a patent attorney, he is a litigator. I have him because it was obvious to me this was not a patent matter, it was a litigating matter. John has been a tremendous benefit in bringing this forward because my patent attorneys were being beaten down. One of the things that I saw when I was going against this Patent Office, the examiner, I had replied with an affidavit and I was using a patent attorney in New Orleans, a very good patent attorney, Mr. Emmett Pugh.

He looked at it, and he said:

> Joe, I hate to tell you this. You are not going to like what I tell you. You submit that and it will guarantee you won't get a patent. Regardless, that this is the truth, because you have attacked one of their examiners. The Board of Appeals you are going in front of, you are not going to sit in front of 12 unbiased people. You are going to sit in front of three judges that used to be examiners. You are attacking one of their colleagues. They are going to respond to protect him.

That shocked me tremendously, made me very angry, because that wasn't describing justice. It wasn't describing what the Patent Office is set up to do. What I am saying, Senators, is those laws have to be changed so those types of injustice can't take place.

This information gets out, and I will see that it gets out, because I care about the advancement of the human race. There is only one way justice triumphs over evil, is that somebody draws the line. Someone has to bite ball and steel and say: "No, I won't back down, not from anything anytime, or anywhere." That person makes that change occur.

I am going to stick to this until hell freezes over. If I didn't get a dime, it wouldn't matter to me. My principles and what I believe in is what guides me and directs me above all else. The injustice here is something I would like to see changed, not for Joe Newman, but for young people yet unborn so that what I have encountered and beat will be an example to them, a lot of incentive for them that will encourage their creativity.

What I would like to do, I would like Dr. Hastings and Mr. Milton Everett to speak. I would appreciate it if you all could go and see this demonstration, because it is very simple. I think that you will see that the invention works as I say it will. It will change this world in a tremendously beneficial way. If what I was saying wasn't true, I would be a total liar and people should totally disrespect me. I would be a fool, a total fool to be pushing this invention

with the vigor I push it and saying I want it to be made public, to have the patent made public so everybody can see I am a fraud.

That doesn't make sense, and I fight like the dickens because I am positive I am right. I would like to submit this book. It is 20 years of my life. No one can read this book and can't see I am a dedicated person. You will see the promise I made to President Johnson in 1967.

I have kept dedicated in my life to my work, even above my family, but they have never been intimidated by it. They have been behind it 100 percent, but nothing has been in front of this.

I am talking about causing space travel to become a reality. Senator Glenn, I think this is something you can relate to. I am saying it humbly. I talked to a friend of yours, Capt. Ron Evans. He and I are very good friends and close, and he made a statement to me once when he came back from space flight and I have a great respect for him. He said: "Joe, you are one of the few people I think can understand what I am saying. Since I came back, normal things in life don't seem important any more."

I could understand exactly what he was telling me, because they hadn't seemed important to me since I was a young man, but I am talking about making space travel a reality. When I give a demonstration next, I will disclose, in fact, I will be applying for a patent application on a space device using this technology in the very near future that will make obsolete the old liquid-burning devices that cost people's lives, caring people.

This Government, our Government should be behind this technology because we are talking about something that is going to make changes in the most beneficial way that is going to boggle people's minds and stir those people.

I thank you all very much for having me.

Senator COCHRAN. Thank you for your comments and your presentation to the subcommittee.

Mr. NEWMAN. Thank you.

Senator COCHRAN. The material you described will be included as an exhibit to your testimony in the hearing record.[16]

Let's now hear from Dr. Roger Hastings, who is at the witness table. He is a senior staff scientist with the Sperry Corp. from Burnsville, MN.

Dr. Hastings.

Mr. HASTINGS. Thank you, Senator. Right away, I would like to point out that I represent myself and not Sperry Corp.

Joe Newman came to Minnesota in 1981. He brought a toy invention for Tonka Toys, and my brother, John, was in charge of new products there, and they talked, as I understand it, for a few minutes about the toy and for about 12 hours about Joe Newman's energy machine.

At that time, Joe had applied for his patent. He was looking for competent people to come and make measurements and submit affidavits to the Patent Office. He asked my brother. My brother said: "Well, I have a brother who is a physicist. He is more qualified to look at these things."

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[16] The information referred to has been retained in the subcommittee files.

I talked to Joe Newman on the telephone, and I had just started working at Sperry at that time. I just had completed 4 years as a professor. I had seen a large number of individuals come into the physics department in North Dakota State University with machines, with ideas that were going to save the world. These people were typically self-taught, not trained in physics or mathematics. They typically were against the scientific community because the scientific community wouldn't listen to them. They were typically very energetic and forceful.

I recognized the modus operandi instantly when I talked to Mr. Newman on the phone, and I explained to him that his motor wouldn't work, and if I came down there, I would be wasting both his and my time and an air ticket because his machine wasn't going to work. And he said, "Well, I would like you to come anyway, and if you can do that, why, I will learn something. If not, why I would like you to write an affidavit for the Patent Office."

Well, I went down there, and I found right away that Mr. Newman was different from the other people, very creative, imaginative, stimulating, a very interesting man to talk with, someone who had come up with an idea, theory an explanation of matter and energy, of mechanical processes, electrical processes, and then gone through the phenomena that we read about in our textbooks and that we see around us and tried to explain it all and had done a credible job of it.

He did not have a mathematical theory, but he had a model that I could see he had very carefully and painstakingly used to provide a consistent explanation of mechanical and electromagnetic phenomena. As I found out, as years went by, this particular model works in the sense that he can design electrical circuitry and predict the performance and so on.

I saw his motor on that first occasion. It was a 600-pound rotor, rotating inside a 5,000-pound coil. He informed me that him and his wife had wound 5,000 pounds of wire onto that coil, which was impressive all by itself. [Laughter.]

Now, he had this motor hooked up as a generator at the time, and by this I mean truly as a generator. He had a generating winding, and I measured the output of the generator and the battery input, and I came up with a figure of 90 percent efficient. I told him, "Well, it is not more than 100 percent efficient."

He said, "Well, it is not quite tuned up. I will get it tuned up and have you back down." When I was on the airplane thinking about this going back home, this motor didn't look like 90 percent efficient. It didn't look like it was 1 percent efficient. It was creeking and moaning and groaning. There was obviously a large mechanical frictional loss. He had taken me down the road about a mile from his home and turned on a transistor radio, and we could hear the motor ticking away on the transistor radio at that distance, so there is obviously radiation loss.

As the Patent Office experts have said in their statements, the motor couldn't be more than 10 percent efficient, and that is what I thought.

But my measurements showed me that it was 90 percent efficient, so I was very intrigued and fascinated. The next time I went down, he had the motor tuned up. Since then I have been measur-

ing more than 100 percent efficient on all the testing I have made. I, over the years, have discussed this with my colleagues at work. I work in an advanced technology group with approximately 50 Ph.D's in physics and engineering. This has provided wonderful lunchtime conversation.

The people there are certainly healthy skeptics, and for a number of years, what would happen is I would run tests; I would come back and talk to my colleagues, and they would suggest their reasons why this testing might be wrong or in error. I talked to Joe about it, he would make corrections, and we would go on and on and on.

I think the testing did become better over the years. However, it was clear that the test results and the affidavits were not doing anything, and in terms of Joe getting his patent, they were falling on deaf ears.

So at some point there a few years back, the testing was given up as not a viable way to get the attention of the Patent Office. Instead, Joe started working on motors that could be made into products, and that is the route he has been taking since then. I think that he has been succeeding very nicely.

The motor you will see here this afternoon is very impressive. It has at least 10 times the efficiency of a high-efficiency electric motor.

I think a car will come out of this soon. Joe is working on a car engine. If the 10 times holds up, we will have a car that runs on electricity that is 10 times more efficient than present electric cars. That means you can run it 10 times longer, which would solve the biggest problem we have with electric cars right now, or it could be used to go faster; or have a heavy electric car.

I think it can proceed from that point to more and more efficient electric vehicles. I think that is a good place for him to start. Hopefully, when he drives from Mississippi to Washington to the Patent Office, they will finally see the light.

Over the years, the testing by myself and by a steadily growing number of people has aroused a lot of attention, and I would say that I get at least an average of two or three calls a day from people all over the world. I have talked to many highly qualified people, many prominent scientists that have heard about it and called and asked about it, and they are not saying, "Well, this is a perpetual motion machine that can't work."

They are becoming more and more interested. The number of these people is growing each day. In addition, there is a large number of people that are building these machines. I would say that there are at least some dozens of groups and individuals around the country that have duplicated, replicated Mr. Newman's motors, and they are having varying degrees of success.

One particular gentleman informs me that he now has a box fan, a large window fan with a 20-inch blade in it that draws 140 watts when he plugs it into the wall. When he runs if off the Newman motor, it is drawing 2 watts. So the numbers are starting to get staggering. I don't know all of these people. I don't know if I have heard about the best results or not.

It is clear to me that there is something very important going on here and that it should continued to be investigated by the scientif-

ic community. It is also clear that Mr. Newman should receive his patent. I agree totally that he has been treated unfairly and that he should have received his patent a long time ago.

As far as the Bureau of Standards testing is concerned, I don't know where they got the idea to test the motor the way they did. I have never seen Mr. Newman test it this way. I have never seen anything written that this is the way to test it. What they did was put resistors across the coil in parallel with the coil, and then they measured the energy, the heat losses in the resistors. They call that the motor output.

Well, this is equivalent to taking an electric motor, saying you are going to measure its output, so you plug it into the wall. Now you go into the next room, where there is a light bulb that is in parallel with the motor, across the motor; you measure the output of that light bulb and say this is the motor output. Now I am going to divide this by the input energy in this circuitry and call it the efficiency of this electric motor over here.

I don't understand it. I don't know where they got this idea. I don't think they made any measurements that were relevant to the functioning of the motor.

Senator GLENN. Can I ask a question here?

Mr. HASTINGS. Yes.

Senator GLENN. I believe the Bureau of Standards testified they were presented this as a generator, and I asked them a question about that a little while ago, and it was tested as a generator.

Mr. NEWMAN. Could I comment, too, Senator? The patent says it is both a generator and/or motor. It should be tested every way. If you test it as a generator, if you test it the way I have said, you should make every test. You should check the torque on the device as well as the energy coming out of the device. They never did test the energy out of the device.

Senator GLENN. Mr. Hastings was describing in some detail that it was not a way to test a motor, but they testified awhile ago they were testing it as a generator. That is all I am saying.

Mr. HASTINGS. OK. The way Mr. Newman has run these motors in the past is you put loads across the motor, but he puts capacitors in with those loads so that the battery current doesn't flow through that leg of the circuit.

Senator GLENN. The claim has been that you get more electrical output than input. That was the reason they tested it as a generator, as I understand it, and I haven't looked at all the data and the test results. That was the point.

Mr. HASTINGS. I think that they may have seen something if they hadn't grounded the machine. They may have seen some results.

Mr. NEWMAN. I will pay anybody $1,000 who holds that ground wire to ground 5 seconds. I guarantee you I will light them up like a Christmas tree. I have stated explicitly that you don't ground this machine, that they have not mastered my technology, the National Bureau of Standards hasn't done so, they state, they didn't look at my technology. They weren't asked to. It is like I have an affidavit from Mr. Ralph Hartwell, an electrical engineer with WWL–TV in New Orleans and he asked a very pertinent question.

He said, "How can you judge somebody if you don't understand their technology and you are judging them by old technology?"

And his comment was, "You cannot," and that is correct, they cannot. They have consistently made mistakes. I was on a talk show with them, I said they had goofed up, grounded the machine.

They came on trying to say I told them to ground it. I didn't tell them to ground that machine. We have it on tape when I was there. The National Bureau of Standards called me up there when they had 30 days to test this invention. They had a wire loose from the commentator. I had to come 1,000 miles to hook that, and any competent electrical engineer could have done that, any unskilled person could have done that. I told them, "You have a chance to benefit humanity, master what I have taught here. Look at Dr. Hastings' affidavit and the other people's affidavits."

It shows in here how this invention, in this book that you have, it is on page, I marked the pages here, on page 37, it shows the same invention that they had, same product, and it shows this drawing, and it is not showing a ground wire. It is just known that you don't ground it unless you see a ground wire.

Mr. HASTINGS. I would like to emphatically agree with Mr. Newman. Even if you are wearing rubber-soled shoes and you touch a wire which is insulated or the motor winding with one hand, you probably won't come back to Mississippi. It is a devastating experience.

There is very, very high voltage relative to ground. That is the radiofrequency power. That is what flows to ground when it is grounded. That is what lights all of the lights that Newman has got; has shown in his demonstrations. But I must also, if I can——

Senator COCHRAN. Let me interrupt you. I hate to, but we have another light that is showing, and that is a light indicating a vote on the Senate floor. Senator Glenn and I must go record our vote on a matter pending on the floor of the Senate. Let's suspend the hearing at this point, and come back and have a chance to discuss this.

Senator GLENN. Just one question?

Senator COCHRAN. Sure.

Senator GLENN. Is Mr. Lyons still in the room, from the NBS?

FROM THE FLOOR. No.

Senator GLENN. Because I thought he had said that Mr. Newman grounded the machine in the laboratory at NBS. Was that correct?

Mr. NEWMAN. Yes, I did, but I did that for a simple reason. If you don't lose out some of this energy, you overcharge the battery. Ray-O-Vac Battery Co. is working with me. I told those people, "I'm not telling you nothing."

Those people told me I was incompetent, and that more than 30 scientists were incompetent. Senator Glenn, you tell me I am incompetent and then want me to tell you how to run your test. I would say, "You tell me I am incompetent; run your own test. Read the book I have here, read the patent application."

Senator GLENN. The question was, When they set up the test out there, did you ground the machine? I had understood that you grounded the machine.

Mr. NEWMAN. I grounded the machine this way. They called me saying the invention did not work. I know a setup, Senator, when I see one. I am a fighter, and I know a setup when I see one, and I saw a setup. The attorney for the Patent Office was over there tell-

ing the people at the National Bureau of Standards what to do like puppets on a string.

They wanted me to tell them something. I wasn't telling them nothing. I was there to do one thing, to show my machine was operable, and I made it operable.

Senator GLENN. Did you ground it, though?

Mr. NEWMAN. Sure, I grounded it, though, that doesn't make any difference. I grounded it because I know how my machine works. I had a battery pack. You overcharge that battery pack, you short them out internally. You can talk with Pat Spellman, the chief director of Ray-O-Vac Battery Co. They sent me numerous batteries.

In fact, they are interested in buying stock in my company because they are convinced that the invention works. This is the people who make the batteries. I sent it to ground because I didn't want to short out the batteries. I don't want to overload the batteries. If those people don't want to listen to me and read my book and see what I teach, I am not responsible for their incompetence.

That is what this will show, 50 years from now, when somebody recommends that one goes to the National Bureau of Standards for testing they will be laughed at, at that time. Ain't no power on Earth that will stop this invention from coming forth.

Senator COCHRAN. The subcommittee will stand in recess for 10 minutes.

Mr. NEWMAN. Thank you.

[Short recess.]

Senator COCHRAN. Could the subcommittee please return to order? At the time we recessed the hearing, we were hearing from Dr. Roger Hastings. I don't want to cut Dr. Hastings off. I don't think he had completed his statement to the subcommittee, and I want you to have an opportunity to complete your statement before we then turn to Milton Everett for his statement.

You may continue, Dr. Hastings.

Mr. HASTINGS. OK. I will just make one more point, and that is that nowhere in writing, never in speaking with Newman, or anyone who is a follower of Newman, have I ever heard it claimed that this was a perpetual motion machine. Newman claims that it is generating energy from an internal source.

He claims that he is converting matter into energy, and it is very well stated in everything that he has written and sent to the Patent Office.

On the other hand, the Patent Office has always consistently claimed that it is a perpetual motion machine; that perpetual motion machines can't exist because they violate the laws of physics, and that this is the reason they won't accept it.

It is not claimed to be a perpetual motion machine, never was, and I don't know where they get the idea that that is what it is. I think I will end my statement at this point.

Senator COCHRAN. Thank you very much. Let's now hear from Milton Everett, who is a mechanical engineer at the Mississippi Geological Department, Jackson, MS. You may proceed.

Mr. EVERETT. Thank you very much, Senator, for the opportunity to be here.

I thank you for the opportunity to be here, Senator Cochran. I have known Joe Newman for 3½ years. My initial contact with

him was over the telephone, and I thought that I could shoot him down by talking to him on the telephone. It turned out that I could not do that.

He adequately answered all my questions. I later went down to Joe's residence with two engineers from Mississippi State University, and they ran tests, and I was an observer.

The Patent Office made reference to the conclusion of these tests, and that they were negative. I would like to tell you that their conclusions was nonconclusive and on the last paragraph, the last page of that report, they state that their evidence and their conclusions was not total and that the device needed further testing.

After that, one of the professors who was very curious went down there on several occasions at his own expense, and at one point in the testing, where he and Dr. Hastings and myself and Joe were there, and they were examining some oscillographs taken of the output of Joe's device, and this professor said, "I can't give you more than 200 percent efficient, Joe," and this was rather remarkable coming from this conservative professor of electrical engineering.

Joe asked him, "Would you put that in writing," and he said, "Yes, I will."

Well, some days later we got a statement from this professor, and he hedged a little bit, but he did indicate that Joe's device was remarkable and that it, indeed, it might defy the laws of physics.

I have witnessed many tests by many people over the period of 3 years, and in all cases, where the device was properly tested, the output was greater than the external energy input, indicating efficiency far beyond 100 percent.

Joe Newman has given the world a source of nonpolluting energy that we need to get on with, and I feel like that he has suffered a great injustice by the Patent Office and by the improper testing by the National Bureau of Standards, and I feel like he needs justice, the world needs justice, the world needs this inexhaustible, nonpolluting source of energy.

The NBS made reference to the fact that they needed to ground the device in order for their instrumentation and tests to be proper. Senator Glenn, if anybody knows better than you do, you do not have to drag a wire with you into space to ground a device. Your instrumentation worked, your electrical devices worked. They did not have to be grounded.

That is all I have to say. If you have any questions, I will certainly try to answer them. I appreciate being here.

Senator COCHRAN. Thank you, Mr. Everett, for your testimony.

Let me ask this. As I understand the difficulty now, Mr. Newman and Mr. Flannery, along with other witnesses, contend that this machine does what Joe Newman says it does: That it works, and it is a patentable energy machine. Those who have testified on behalf of the Government say that their findings are the machine doesn't work. It seems to me that with the degree of expertise available to the Federal Government that we ought to be able to answer that question with some degree of certainty.

If the tests weren't conducted in a way that can be approved by the inventor, it seems to me that another test is indicated that would be approved by the inventor.

I don't know that that is going to answer the entire dispute or solve all the problems, but I wonder what your reaction is to that. Mr. Flannery or Mr. Newman, either one, can answer that.

Mr. FLANNERY. I have a couple of reactions. The tests of our patent laws are: new, useful, can do something, it works, nonobvious, it is not something that someone would have.

What I was saying is that the tests in the law is that it is novel, new. Is it useful? Does it work? Is it nonobvious? It is not something that if you had a problem and you were going to solve it, it would be obvious. There must be no prior art, that is, the device hasn't been around for more than a year, as Joe said earlier.

The Patent Office in the normal case, even if they believe it is a perpetual motion machine, asks the applicant to come forward with evidence which consists of affidavits.

There has not ever been a situation, and indeed, all through the case, up until the special master said the device operated, there has never been a case where they tested a device in any patent case. There has never been a case in American history where the NBS or anybody else in litigation or otherwise has gone out and tried to test something.

Indeed, the examiner who denied Joseph Newman a patent has granted patents for devices that do not operate; have never been built; and have never been demonstrated to the Patent Office to work, and there are other cases.

On one level, what I am saying is that is not fair, and on another, I am saying that we have already gone to the proof. In fact, we have Roger Hastings, I suppose that the testimony is not under oath, but we have brought evidence here today that it does operate. And if I can respond a moment to the ground question, we lose sight a little bit of the fact that the NBS, instead of acting as an independent testing agency, is acting as an adversary here.

When I came to this litigation and when I thought of the NBS, I would think of them as a laboratory, as I am sure most of you do. But then they asked us to tell them how to test. We said, "You are the ones who asked how to test. You test it any way you want. You are going into a courtroom, and anything we say to you, you are going to try to claim that we told you to do this, that, or the other thing.

"So we don't presume to tell you, who hold yourself to be a preeminent national laboratory, how to test it. That is going to be your proof at trial. You rely on that. You develop your own proof your own way. We don't have any obligation to tell you how to prepare your case."

But we did respond by saying what we have done and told them what we had done, which was that we had never connected the device to ground. To resist testing the device, the NBS insisted on communicating with us by correspondence, rather than by telephone.

Although I would be standing in a room with them and they would have a question to put to me, they wouldn't ask me the question when we were standing there. It was right after he produced the device in January——

Senator COCHRAN. I don't think my question was understood. Would another test help solve the problem if the test could be done in a way that could be approved by the inventor?

Mr. NEWMAN. The point I would like to make, Senator, is that the major point here is whether the Patent Office or Joe Newman has met the patent law and the Federal law, not whether this invention works, that is not the point. See, I know it works, and it will work. No power in this world is going to stop this invention.

Senator GLENN. The Patent Office wants to know that it works, too, before they grant a patent. Otherwise people come in all the time with ideas that are really off the wall, crazy ideas. I am not saying this is one of them. But they are also trying to make certain that the device works as advertised according to accepted laws of physics. You are going a little step further than the accepted laws of physics.

Ordinarily, as Mr. Flannery says, they don't put things out for tests, but ordinarily, they are working with the laws of physics as accepted now; they are working on things on that basis, and so they can grant a patent once they see the circuitry and say, "Yes, there is an exact application of existing laws of physics."

Mr. NEWMAN. I wish that was true, Senator, but it is not true. You are giving them credit as it would seem logically they would have performed. If they could perform the way the law said, I would agree with you 100 percent.

They have not. They don't guarantee the credibility of a patent.

Senator GLENN. I think the point the chairman is making is an excellent point here. If there is additional testing needed here because of the claim of additional laws of physics and a real breakthrough, it isn't all that complex. I am no excellent scientist, but you have a certain input, and you have a certain output. And I dont' care whether it is a 500-pound machine or a 5-ounce machine, you measure input and output and it either does it or it doesn't, and I would think a very clear-cut test along that line would be in order. What is wrong with that?

Mr. NEWMAN. What is wrong with it, Senator, is it goes against what I fought against. You all are missing the point. I am sorry. I won't agree to that, no. No. Under no circumstances.

Senator GLENN. You won't agree to a test of input and output energy?

Mr. NEWMAN. I will not send it back to the National Bureau of Standards means that what I am saying is it is OK for you to do this to other people, and I am saying no, it is not OK. The aspect of the invention—see I am right, Senator, and I am going to change the laws, maybe after I am dead and gone, but I am going to stand my ground.

Senator GLENN. I am on your side. I want to convince them you are right. How can we better do that than to measure input and output?

Mr. NEWMAN. Anybody outside the National Bureau of Standards; Dr. Tsoupas, who was a nuclear physicist in research at Yale University, never met the man in my life. He read my book. He cared enough that he wrote to his Congressman—he is at Brookhaven Laboratories now—saying the tremendous impact this invention is going to have on humanity. If somebody like Dr. Tsoupas

wishes to test it at Brookhaven Laboratories and he wants to get them together, sure I will agree to that, anybody who is objective; not nobody that I know is biased and prejudiced in advance, saying this is impossible and I am a fraud, and I am going to turn my invention over to them to test.

I have gone through the pain of the master at a cost of $11,600.22. That was a mockery of justice, a total mockery of justice. To run more test, that means that all the 30 scientists who have already tested this invention, it means their reputation is worth nothing.

Senator GLENN. Here is what the Patent Office is concerned with, though, too. They have all these ideas come in, and they have to sort them out, and if they are logical and they fit accepted authority, then they go ahead and grant the patent and there isn't any question about it.

Where you have one like yours, it does go outside what are the accepted norms that they haven't dealt with before. Then they wanted some testing of this, and there is a good reason for that. Once a person is granted a patent, then they are going to go out, sell stock, they are going to promote this thing——

Mr. NEWMAN. Senator, I——

Senator GLENN [continuing]. Wait a minute—they are going to go to the widows and orphans and say, "We have got an energy machine here that puts more out than it takes in."

There are going to be all sorts of schemes, so that Patent Office is charged with making sure that under existing science as we know it now, and you may well have gone beyond that for all I know, under existing science you can't let the jokers and crooks and swindlers get ahead here.

I am not saying you are in any of these categories whatever. That is the reason that I want to make sure. What is wrong with the test?

Mr. NEWMAN. What I am saying, though, Senator, is that I agree with you 100 percent. I hate to see anybody taken advantage of. If the Patent Office was going to do that, but I am a factual person. I am a scientist. I deal in fact. I offered to pay to do exactly what you are saying. I offered to pay the examiner's way to my home at my expense to bring any equipment. It is all in the record.

He would not come. What they did do is send an attorney to my home when I was taking the deposition.

Senator GLENN. Would you submit to a new test as the chairman suggested?

Mr. NEWMAN. Not to those people, no.

Senator GLENN. Would you submit to Batelle Laboratories? They have scientific experience.

Mr. NEWMAN. No, I would not.

Senator GLENN. Who would you accept, then, as an expert? Would you give it to Sperry and have them supervise it with Mr. Hastings up there and let Sperry test it?

Mr. NEWMAN. If Dr. Hastings was involved, sure, but not anyone that I think could have influence put into them.

Senator GLENN. Who would you suggest as outside experts that you could use to convince the Patent Office that you are right?

Mr. NEWMAN. Why don't we do this, Senator? What I want to key in is I have a statement from the National Bureau of Standards, these very experts and the scientific method is simple. You let the facts, not biases and prejudices, prove or disprove the theory. They stuck their neck out. I didn't ask them to stick it out. Rabinow stated you build your motor—because he doesn't use an iron core coupling, it will be highly inefficient. If you want to run a fan, don't use a Newman machine. Try a copper wire.

I have got a fan. Let it speak for itself, the scientific facts. I am saying by their own statements, they agreed that this invention works, because I will show the extreme opposite result of what they are saying and it will be six times the current going back into the battery coming out of it.

Senator GLENN. I took over the questioning, here. I am sorry. I didn't mean to get in the middle of this, but I thought what the chairman was suggesting was excellent. You could get this, and it is very simple to measure a machine, measure input and output.

Mr. HASTINGS. Let me make a comment on this. There was a time, I think, when I was the only one that had submitted an affidavit, and I believe the Patent Office told Joe, "If you get one more expert to submit an affidavit, we will grant your patent." He got 29 more, 29 more, and there have been a lot of tests. There have been many, many tests. These are scientists, technicians. They are qualified people.

Senator GLENN. I understand. Much was made earlier about Mr. Schuyler and his position in this whole thing and that he was the master that was appointed by the court and so on and the judge wouldn't accept his recommendation, I guess, right?

Mr. FLANNERY. That is right.

Senator GLENN. Before all that, before he was appointed master, had you ever known Mr. Schuyler before?

Mr. NEWMAN. Yes; I had met him one time, and I reported that to the court. He didn't even remember me.

Senator GLENN. What was the relationship?

Mr. NEWMAN. He was working for, with the firm of Hallburtz, Schuyler & McKee. I believe the name is correct. He was working with a patent office firm here in Washington, I think it was Hall, Burt, Schuyler, McKee, & Beckett. I am pretty close.

Senator GLENN. Didn't he represent you earlier?

Mr. NEWMAN. No, he didn't represent me.

Senator GLENN. He was a member of a firm that represented you right?

Mr. NEWMAN. He did not represent me. What he did was represent the Department of Commerce, because he had worked with them. What he did is call the Department of Commerce. He was not representing me. He doesn't even remember meeting me. He looked at a paper that I had way back—I forgot the date, I think it was somewhere around—I am kind of bad on dates, but somewhere around 1975 or something like that, maybe 1974. I don't really remember, I may be off there a year or two. But he sent me to the Department of Commerce.

He didn't remember that, because I reported it to the judge. The judge asked him, and he didn't even remember talking to me,

which I believe he was telling the truth. I talked with him for 15 minutes.

Senator GLENN. He was listed in your book here. In the letter you sent to the Department of Commerce back in 1975, the firm Schuyler, Burt, Swindler, McKee & Buck was listed as having passed on your scientific developments you had submitted to them.

Mr. NEWMAN. That was Hall Birch, not Mr. Schuyler. Hall Birch was my patent attorney.

Senator GLENN. You refer there to your patent attorney firm and list the firm there of Schuyler.

Mr. NEWMAN. Yes, but Mr. Schuyler did not know me personally. He didn't even remember me. I don't have anything to hide, Senator. You look me in the eye, Senator, and you won't see any eye blink one time. I am telling the truth.

Senator GLENN. I ain't blinking, either.

Mr. NEWMAN. You are asking, I see where this is going, that there was some bias and prejudice in the master's opinion. If I thought that——

Senator GLENN. No, no, just a minute, Mr. Newman. Let me call you to task on that. You are saying I have a biased opinion on that. Retract it. I am bringing out information. Make no accusation of a Senator here or you are in deep trouble.

Don't make any accusations that I am biased going into this. I am not. I am just trying to bring out a couple of facts.

Mr. FLANNERY. We are not accusing you, Senator, of being biased and prejudiced. I am sure you objectively seek to point out facts that you think are material but the plain implication of your question is that there is some relationship between Mr. Schuyler and Mr. Newman.

Senator GLENN. I asked.

Mr. FLANNERY. You must agree that the plain implication of the facts that you have selected that the conclusion that may be drawn is that even as this witness, Mr. Newman, is trying to state for the record that he was not, in fact, represented by Mr. Schuyler, disclosed that fact even as he objected to the appointment of Schuyler as special master, and the special master said to the court that he had no recollection of the prior association.

Senator GLENN. Did the judge know that there was this prior association with that firm?

Mr. NEWMAN. Yes, he did.

Senator GLENN. At that time?

Mr. NEWMAN. I wasn't talking about your bias and prejudice. I could see where you were going, saying or the possibility that Mr. Schuyler, that Mr. Schuyler was biased or prejudiced.

Senator GLENN. I will determine where I am going.

Mr. NEWMAN. I clearly tell you, he was not. If I had anything to hide, I wouldn't have told the judge that.

Senator GLENN. Did the judge know at the time he appointed this master that he had been part of the firm you had used earlier?

Mr. NEWMAN. Yes. I didn't tell him, my attorney, Emmett Pugh, the patent attorney at the time told him. I had nothing to hide and consistently I have disclosed everything.

Senator GLENN. I am not saying you did. I just knew of this past association here.

Mr. NEWMAN. In the judge's comment, he writes about that. He said Joe Newman said he had met Mr. Schuyler. He talked with him about it, and Mr. Schuyler hadn't even any remembrance of talking with me.

Senator GLENN. I would think it is very simple to measure a machine. This may be a complex machine. It obviously is. You are dealing with fairly small amounts of energy here, from what we have seen. But I think that that, once again, it is easy to measure, and I would think one would be able to do that with either some company or some independent agency; that it would be well worth your while to do it that way or through a government testing laboratory of some kind, whether the National Bureau of Standards or other. I don't understand why there would be a hesitancy.

Mr. NEWMAN. Let me ask a question, Senator, but I'm sorry, your statements offend me. I have 30 men. I have respect for those men. They put their reputation on the line. What if you came to me and I came to you, and I asked you, Senator, I have been in outer space, and I have an invention that is going to carry people up there safely, and I would like for you to come see it, and you say, "Joe, I'm sure you are wrong."

I say fine. You show me I am wrong, I will take that information and use it. Let me turn it around on you. If you come down and I prove I am right, will you come down and speak on behalf of this invention for humanity and you come down and listen to my technology and test the invention and then you put your reputation on the line, and you know the significance of what you have attested to, something that is going to change the world and you have worked hard for your reputation; as all of those people have.

Discount those 30 people, that is what it is saying. It is saying they are discounted. The master gave them the credit they were due, and I won't let loose of it.

Senator GLENN. I would think a good solution to your problem is that we submit this for testing and maybe the first tests weren't run the way you liked. Also, what we are charged with here is making sure that patents are not granted to things that are not proper. That is our role, that is all we are trying to find out, should there be a patent granted or not. I frankly don't know. I am agnostic.

I am in neither direction on this thing. I am happy to be shown if we can have some independent testing, and I may become your biggest advocate, I don't know. On the other hand, if it doesn't test out right, why, input versus output is pretty simple to measure. Mr. Hastings knows, and you know, too.

Mr. FLANNERY. Senator, let me point out, there are a couple of problems.

Senator GLENN. You make it a matter of trust. The Patent Office, in making a patent, can't say, "We trust everybody that comes through the door with a new idea." They have to prove it unless it is under some accepted scientific forums.

Mr. HASTINGS. Let me say that the testing, while it is, I agree, simple, the results have not been accepted. When I take a precision device, the one that is accepted as the standard in the community, namely, an oscilloscope, I do precision measurements of input and output, measure simultaneously current and voltage, multiply

them together, integrate it, standard procedures, what answer do I get? "The machine is screwing up your oscilloscope, Mr. Hastings."

So I go to another device, same answer. The fact of the matter is, the test results that have been presented have not been believed because there is something very basic here, and that is this question of whether it is really putting out more than it is taking in. So for that reason, the tests aren't simple. You can't do them with standard equipment. I think the other route, though, is succeeding, and that is that Newman has now got devices that are at least 10 times more efficient than what is out there today, and what is out there today claims to be 80 percent efficient.

Now, that, anyone can look at. As a matter of fact, what I think is that if this goes a little bit further, these products will be in the store and the skeptics who don't believe it are going to be at the end of the line and everybody else will have these in their homes first.

Senator GLENN. I hope you are right.

Mr. FLANNERY. Senator, there has never been an objection by Joe Newman and it continues to be the case today, that anybody who comes forward to run a test, he has permitted them to run a test when they are independent and so forth. Our objection, indeed, Roger Hastings and the other scientists who have sworn, ran independent tests. They came there in each case believing the device wouldn't operate based on their training, as you have been discussing.

So they came there prepared to dissuade this well intentioned but incorrect gentleman that his device couldn't possibly operate the way he said.

And Joe Newman is operating on two levels: On one level, he is welcoming people who want to come to test his device and do it fairly. We are, we suffer under the history of having fought with people that I think we presented some evidence have not done if fairly, and it there is any heat in this room from this side of the table, it is the frustration on the other hand, not the scientific inquiry, but the battle for a person who has spent 6 years of his life, and if it is a good idea——

Mr. NEWMAN. Seven years.

Mr. FLANNERY [continuing]. It doesn't seem to me that that is exactly the way you promote science, and if the system is that you have to, when you come up with a new idea, it should be given some chance to be tested to itself and passed on and then given an opportunity to fail, whether it is in universities or marketplaces or wherever.

If there is energy on this side of the table, where it is who distrust of who is going to test it, it is born of people who say one thing and do another. Joe Newman, who is litigation's dream in the sense of documenting people making statements and with videotape and so forth, and if you see energy and resistance and fighting from this side of the table, it is people who are in the trenches who have a lot of trouble addressing the cold language of a statute or statements submitted as to this committee of things that happened when it is our experience that things aren't working that way.

Senator GLENN. What you are talking about is brandnew. You are talking about changing mass into energy by a different way than it has been done before. That is the transfer of gyroscopic particles, and I have read some of the material, and I understand that.

So you don't blame people for being a bit skeptical.

Mr. NEWMAN. I don't.

Senator GLENN. Let's get it proven one way or the other by real testing, input and output; you either have it or you don't.

Mr. NEWMAN. Let's say I was a boxer and I challenged everybody in the world. And I have just knocked out 50 guys. I have said OK, I challenge anybody in the world to come and box me, and I don't get the first person. Wouldn't you agree that something is bad wrong. I have already knocked out the top 50 people in the world. I say I challenge anyone else in the world, any time, any place.

Senator GLENN. I am not going to volunteer. [Laughter.]

Mr. NEWMAN. I have an open, honest challenge——

Senator GLENN. I understand.

Mr. NEWMAN [continuing]. To make to the scientific community, I mean that sincerely and humbly, and openly. I have a device down there right now that will prove this to anybody who wants to use their minds. Don't listen to Joe Newman, listen to the facts. Let the scientific method prove or disprove it.

If you just come down there and take a look at this, and then if you don't agree, that, well, that looks most impressive based on what Joe Newman says should happen, look at what the National Bureau of Standards has predicted what will happen and let the scientific method dictate.

Let the facts prove or disprove the theory, and you will clearly see that what I teach occurs down there; what the National Bureau of Standards, in all of their expert opinion, predicted is totally false, totally opposite, and again, I say, this is the scientific method. It shows it right there that it is correct.

The thing I am wanting to do, Senator, is I say that we went to the National Bureau of Standards and the Patent Office. The things that bothers me is then I am setting a record, even if they wanted to do it, and they say, "Now we have tested it, Joe, and it is OK."

It says, anybody else who comes along, if it was you being born again and it was 50 years from now and you came up with something, and they put you through the same injustice and they said, "What are you complaining about? Joe Newman went through all this, and he didn't complain. He let us do it."

I say no, I am drawing that line, and what I see is an injustice. I don't have any complaint of proper testing. Dr. Hastings will tell you, Milton will tell you, anybody I talked with that is objective, I tell them, prove me wrong. I will take that information and use it.

I just asked them another question: Will you have the courage and character if you come down and test this invention to speak out for humanity? That is the agreement I made with people, an honest agreement.

When I talk to those people, I have never had a man talk to me and look me in the eye and thought I was a con man when I talk about my years of work and they see my dedication. I have never had.

I have had the Patent Office imply it. They didn't look at my work. I have had the National Bureau of Standards imply. They didn't want to look at my work.

Mr. HASTINGS. As a scientist, I would love to see more test data. I think that is what is needed. I think Newman has been put through enough. I don't think he should be made to wait any longer. His patent should be issued.

Senator COCHRAN. I think it would be helpful for our hearing record if we could have a list of those who have tested the machine.

Mr. NEWMAN. It is in the book, right here.[17]

Senator COCHRAN. That is a part of the record, then, because we have made it an exhibit to your testimony. I wanted to be sure that we had the names, and if you could, the credentials, the professional qualifications and backgrounds of those who tested the machine listed for the record. I am also going to make a part of the record for your information a chronology of events that my staff has compiled during our review of these issues of the initial application for patent and up to the current date in your dealings with all of the Federal agencies in which you have been involved over the past several years.

That chronology is as complete as we have been able to make it. It will be included in the record to illustrate the activities that have been occurring. We appreciate very much your being part of our hearing and presenting your testimony to us as a panel.

[The chronology referred to follows:]

Chronology

March 22, 1979: Joseph Newman made his first application to the PTO for a patent on his energy machine. The application in issue was filed August 18, 1980.

January, 1982: The PTO rejected Newman's patent application stating that the invention "smacks of perpetual motion." It is PTO policy that "alleged inventions of perpetual motion machines are refused patents." Newman denied that his invention was a perpetual motion machine, and requested reexamination. The application was again rejected.

During 1982: Newman claims he was told by an official at the PTO that "We will never grant you a patent no matter what evidence you submit."

July 3, 1982: Newman appealed the patent examiner's rejection to the Board of Patent Appeals, which rejected (November 5, 1982) the grounds on which the examiner denied issuance of a patent and upheld denial on the basis that the machine could not work.

Throughout this period, the PTO refused to test the invention.

November, 1982: The National Bureau of Standards (NBS) issued an unfavorable evaluation of the machine for the Energy-Related Inventions Program, to which Newman had applied for a grant. However, NBS had not tested the machine.

January 3, 1983: Newman filed suit against the PTO in the Federal District Court for the District of Columbia.

August 15, 1984: Judge Thomas P. Jackson appointed William E. Schuyler, Jr., an electrical engineer and former U. S. Commissioner of the Patent Office, to evaluate the energy machine since he did not feel personally qualified to render such an evaluation.

September 28, 1984: Following an investigation, the Special Master issued his report with recommended findings of fact and law. Among the recommended findings of fact, the Special Master determined:

"Evidence before the Patent and Trademark Office and this Court is overwhelming that Newman has built and tested a prototype of his invention in which the output energy exceeds the external input energy; there is no contradictory factual evidence."

"There is ample evidence that a person skilled in the art could build a system like Newman's prototype by following the instructions of the patent application concerning figures 5 and 6."

"Newman has specifically disclaimed that his invention is a perpetual motion machine."

"Key to the decision of the Board of Appeals is its findings that a motor like Figure 6 of Newman's application 'would not and could not be made to operate at an efficiency level greater than 100% as recited for example in generic claim 43. Such a machine is impossible.' That finding is clearly erroneous."

The Special Master did find that there were genuine issues of fact regarding the operability of other Newman claims and the patentability of Newman's device in view of the prior art.

Among conclusions of law, the special master recommended that Newwman did not need to state the scientific principles underlying his device, that he had demonstrated the operation of the system and was entitled to a patent if he otherwise satisfied the requirements of the patent statute. He recommended that the case be remanded to the PTO for consideration of an amendment to the claim only and to prove the operability of the other claims.

October 31, 1984: Judge Jackson heard oral arguments regarding the special master's report.

November, 1984: a second, court-ordered examination by the PTO in light of the master's report resulted in a refusal by a different examiner to issue a patent and a request to produce a model for testing on November 30, 1984.

February 28, 1985: Newman refused to produce a model of the machine and filed motions for clarification of the test conditions.

June 18, 1985: The District Court refused to accept the findings of the special master, although he cited no evidence that they were "clearly erroneous" as required by the Federal Rules of Civil Procedure. Newman was charged $11,000 for the special master's report.

October 2, 1985: Judge Jackson ordered Newman to deliver his machine to the NBS for testing. The order prohibited Newman or his representatives from attending any of the tests, provided that the testing be done at the discretion of the NBS, and authorized NBS to disassemble or destroy the device.

January 13, 1986: On appeal the Court of Appeals for the Federal Circuit ruled that Judge Jackson had exceeded his authority with his "highly irregular" procedures and that these testing conditions were fundamentally unfair. The higher court established new testing conditions requiring NBS to submit a testing program and to conduct tests within 30 days, allowing Newman to be present, and prohibiting dismantling or destruction of the invention.

January 24, 1986: Newman delivered his machine to the NBS for testing.

February 24, 1986: After 30 days, the NBS had failed to test the machine, violating the Appeals Court order. When Newman's attorney attempted to retrieve the machine for Mr. Newman, Judge Jackson impounded the device without a hearing, citing no factual or legal authority to do so. Judge Jackson extended the time for NBS to conduct testing to June 26, 1986. Newman contested the extension and requested that the Judge be removed from the case due to personal bias.

June 26, 1986: The NBS issued its report finding that the Newman device did not operate as claimed.

Trial has been set for December 8, 1986.

Legislation

Private relief legislation, ordering the Secretary of commerce to issue a pioneer patent to Joseph Newman, has been introduced in the House of Representatives by Congressmen Dan Burton, Trent Lott, Tom Kindness, Bob Torricelli, Bob Livingston, Wayne Dowdy, Hal Daub, William Dannemeyer, and Billy Tauzin. The bills are pending in the House Judiciairy Subcommittee on Courts, Civil Liberties, and the Administration of Justice chaired by Congressman Bob Kastenmeier.

Senator COCHRAN. We have one final witness from the Department of Energy which we would like to hear from, let me announce that there will be a demonstration of Joseph Newman's energy machine in room G-50 of the Dirksen Senate Office Building. That is in this building, immediately following the hearing. Thank you very much for your testimony.

Mr. NEWMAN. Thank you.

Senator COCHRAN. Our witness from the Department of Energy is Jack Vitullo, who is Director of the Inventions and Innovation Programs of the U.S. Department of Energy. We have a statement from Mr. Vitullo which we will include in the record.

We appreciate the cooperation of the Department of Energy with our subcommittee and our efforts to try to find out what the facts are in this case. There is an energy-related invention program which Mr. Vitullo directs and which was established in 1974. We have asked him to be here today to describe this program and the activities of the Department of Energy in encouraging and developing ideas of enterprising individuals and small businesses, which can improve the national energy supply and utilization of energy.

We thank you for being here to provide us that information.

TESTIMONY OF A. JACK VITULLO, DIRECTOR, INVENTIONS AND INNOVATION PROGRAMS, U.S. DEPARTMENT OF ENERGY

Mr. VITULLO. Thank you, Mr. Chairman.

As you stated, I am the Director of Inventions and Innovation Programs in the Department of Energy, and my primary discussion today is on the DOE Energy Related Inventions Program. As you indicated, it was established in 1974 by Congress, and it relates to tapping the creative resources of individuals and small businesses in improving national energy supply and utilization. To our knowledge, it is the only Federal program chartered to do this function.

The program is operated jointly by the National Bureau of Standards [NBS] and the Department of Energy [DOE]. NBS performs the screening and evaluation of ideas submitted, and DOE provides the support for those inventions recommended by NBS as most promising.

At this point, I would like to make a clarifying statement. It should be noted that NBS's operation at Tenley Edison was divided as far as the testing of Mr. Newman's device. The NBS office involved in testing Mr. Newman's device is not the same NBS office that conducts evaluations under the Energy Related Inventions Program. The testing that you referred to was done by several organizations, not the portion of NBS that we operate with. It was a separate office that does not work for the energy-related program.

However, Mr. Newman did submit to NBS a request for evaluation and entered this program as a separate action. That evaluation resulted in a negative finding by NBS and was therefore never recommended to DOE for support. This program, as we said, is operated jointly by NBS and the Department of Energy. Of the 1,200 to 1,400 applications submitted each year, NBS recommends 35 to 40 to DOE for support. Once the invention is recommended to DOE, the focus shifts to the inventor.

Our staff works with the inventor to help them develop an action plan to take the invention through technical development to the marketplace. Then DOE determines the mix of assistance that we can provide.

DOE support includes technical development, grants, and nonfinancial assistance, such as technical advice and introduction to other resources. Our grants range from $20,000 to $100,000 with an average of $70,000 and are designed to help the inventor through the next step or two of technical development.

This usually involves prototype development or testing. In addition, we provide a workshop for these inventors to expose them to experts in the legal, business, engineering, marketing, and venturing community. After completion of the grant, our office maintains a relationship with the inventor, offering introductions to other resources as additional information and technical development indicate.

As a result of these procedures, of these efforts, over 40 technologies of the 234 that have received DOE support are in the marketplace today. These products have accounted for over $100 million in sales with corresponding employment and energy savings. Still other technologies are proceeding toward the marketplace with great promise of energy and economic impact.

The energy inventions recommended to DOE run the gamut from industrial processes to drilling equipment to agricultural products. Some of the most interesting inventions include the packaging of fruit for shipment without refrigeration, and we would like to show you those in a minute; microwave pothole paver; composite reinforced natural gas pipe and a method of reclaiming waste fiberglass from old filter cuttings.

At this point, if you would like, Senator, I can give you some visual indications of these inventions.

Senator COCHRAN. That is fine. We would like to see that.

Mr. VITULLO. First, I would like to talk about the packaging of fruit for shipment without refrigeration. One of our inventors came in with a request that we help him in packaging fruits that could be shipped without refrigeration. The idea behind it is to reduce the oxygen, carbon dioxide, and moisture in the packaging; ship it without refrigeration; and when it reaches the marketplace, it would stay fresh for 2 to 4 weeks.

These are now sold in the Washington area under the name "Tomahto" and the same procedure is being used to test the shipping of fruits and vegetables from Chile and other places by ship without refrigeration. We gave him a modest grant, which enabled him to develop a package. We have some of these tom-ah-toes for certain members of your staff.

Senator COCHRAN. Under Gramm-Rudman we need all the help we can get, I guess. [Laughter.]

Mr. VITULLO. Before Gramm-Rudman, we would have brought a larger box. A second item we have is the microwave pothole paver, and this is the one that was developed in order to address some of the most serious problems. One of our inventors who has a long history of working in microwave technology thought that using microwaves to pave potholes would provide an easy and more effec-

tive way of doing it. He worked over a number of years in developing the concept.

We helped him develop the test procedures. After the tests, he developed a piece of equipment—I have a photo I would like to submit for your viewing—which will heat up potholes to uniform temperatures of 350 to 400 degrees. Old pieces of asphalt are then thrown into the hole. The asphalt melts down like an ice cream cone. The microwave heat delaminates the pothole and takes all the moisture out of it. Allowed to cook, it makes an even patch and stays for a long period of time. That was one of the inventions that we supported.

Another one that we supported is a composite reinforced natural gas pipe or tank. This is a cross section of the tank developed by one of our inventors. This is aluminum reinforced with epoxy and fiberglass. It provides a gas tank having four times the strength of the steel tanks for the same weight and purpose. It is the one item that has made the natural-gas-powered car feasible.

In fact, we demonstrated this in Jackson, MS, about 3 months ago. It has multiple applications. Because it is a composite material, it is not easy to rupture and can be used as a crack arrester on cross country pipelines. In addition, there is an indication that this particular device or technology can be used to reinforce lower grade U.S. steel and match the quality of the imported steel currently used for pipelines. We are developing, with the Gas Research Institute, tests to see if this opinion can be proven.

The last invention I want to bring up is the fiberglass reclamation system. As you know, many of the filters that we use are made from fiberglass, the manufacture of which results in a lot of cuttings. These cuttings present a substantial disposal problem. One of our inventors came along with an idea of putting it in an acid bath, and out of that, he would reclaim pure fiberglass and a form of urea that could be used for fertilizer. At an estimated cost of 20 cents, he can get fiberglass worth 35 to 50 cents a pound and as a byproduct, the urea that could be used for fertilizer. That equipment is currently in production.

Those are some of the technologies supported by the Energy Related Invention Program. We have a large number of those. We just wanted to highlight these as examples of the range of inventions that we are trying to support to help the individual inventors, particularly those who can't get help from other sources.

We also sponsor regional workshops directed at the innovative community at large to try to help the innovator/investor to network across the country. These workshops are arranged at the local level and underwritten by DOE and NBS to permit entrepreneurs and innovators to exchange information of mutural interest and to discuss the solution of the problem of getting to the marketplace.

The costs are kept low so that individual inventors can go to these. The registration fee is typically less than $60 for a 2-day session, which includes meals and class presentations. Normally 6 are held each year, and so far we have held 34.

In conclusion, I would like to make the statement that this program is available to all inventors of energy-related inventions, particularly the individual and small business person with limited re-

sources. The NBS evaluation is available at no cost and can lead to the successful development of an idea. This is the hope we offer to the inventor and the individual, and it has been fruitful.

Mr. Chairman, that concludes my testimony.

Senator COCHRAN. Thank you very much.

I think it has been very useful for us to hear about the program at the Department of Energy and how it works. It is encouraging to know, for instance, that we have a department in our Government interested in encouraging innovative ideas and the development of new technologies to help in the energy area, help our Nation become stronger and more energy self-sufficient than it has in the past, and I think this is something that a lot of people don't know.

The Department of Energy has this program; it has been working and has resulted in the bringing to the market new products, technologies and devices which are strengthening our economy and strengthening our country.

Let me ask you this: If a person like Joe Newman has a device that is an energy-related device, is your office available for an evaluation of that device or machine to try to help determine if it is a feasible, a workable new invention?

Mr. VITULLO. For your information, I don't believe it was clear in the testimony. Mr. Newman did submit his device to NBS as part of our program. He was turned down by NBS in what we call the first stage evaluation. He subsequently resubmitted a request to NBS for an evaluation. An evaluation was made, and it was turned down. But as we have indicated, it is still open to Mr. Newman to resubmit additional information. We have discussed this.

Senator COCHRAN. Why was it turned down? Can you tell us about that?

Mr. VITULLO. It was not our office that turned it down, but I can submit for the record the letter that turned it down.

Senator COCHRAN. Could we have that for the record, or a copy of it?

Mr. VITULLO. I have it, a copy of it.

[The letter referred to follows:]

DEC - 3 1982

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

Mr. Joseph W. Newman
1521 Deerwood Drive, East
Mobile, Alabama 36618

Dear Mr. Newman:

We have completed evaluation of the invention entitled "Unlimited Source of Energy," which you submitted in accordance with Section 14 of the Federal Nonnuclear Energy Research and Development Act of 1974.

Your disclosure describes a direct current electric motor. It is claimed that because of conversion of some of the mass in the passive field coil to energy, the shaft output of the motor is greater than the equivalent electrical energy into the motor.

As you know, we are unable to accept your claims in spite of the test data you have provided in support. The tests you have made on your motor are not at all conclusive. For example, the method of loading the motor does not seem valid in that there is no way of knowing what the load was. The use of a conventional DC motor running at a very low speed to calibrate the oil pumped also appears questionable. The oscilloscope data presented are nearly impossible to interpret; the difficulty of integrating the product of two traces which are alternately positive and negative is subject to large errors. Comparison of your motor to a commercial motor may also be subject to considerable error since the commercial motor was probably operated well away from its design condition.

Since your claims and test results are contrary to what can be expected by analyses based on accepted scientific principles, and the validity of the test procedures is questionable, we are unable to justify a recommendation for Government support of your invention. We will be happy, however, to reopen our evaluation and reconsider at any time if you wish to address this concern.

Please note that the basic problem is the claim that your device is able to deliver more energy than it consumes, with no founded explanation of the source of the additional energy produced. A violation of the First Law of Thermodynamics is thus implied, and where this is the case, our requirements for supporting data and rationale are rigorous. For us to reopen our evaluation, you would probably need to have your motor tested under carefully-controlled conditions, probably by an independent, certified laboratory, with rigorous data acquisition and supervision using such instruments as prony brakes and dynamometer-type watt meters.

We regret we are unable to be of further assistance at this time. If you have any questions, please feel free to call or meet with Tom Coultas, who may be reached on 301-921-3583.

We appreciate your interest and participation in our program.

Sincerely,

Original Signed by George P. Lewett

George P. Lewett
Chief, Office of Energy-Related Inventions

Senator COCHRAN. We will make that an exhibit to your testimony. But in effect, what does the letter say? Can you just tell us in one sentence what it says?

Mr. VITULLO. It says that it is not technically feasible.

Senator COCHRAN. Let me ask you this question. If on another review or a test of the machine it proved to be feasible or it proved to work as it says it works, what would your office be prepared to do then?

Mr. VITULLO. At that point, he would enter the program like any other inventor. He would have to be recommended to us by NBS. NBS would make that determination. When it enters the DOE part of the program, we would then assign an individual to work with him, and in his case, knowing what we know now, the only thing we could do for him now is to conduct a test or have a test conducted at an independent agency.

Senator COCHRAN. An independent agency would have to conduct a test, is that what you are saying?

Mr. VITULLO. We normally provide grants to do what the inventor wants to do. In this case, it is very clear that the needed requirement would be a test, and we would support that, instead of supporting prototype development or a marketing plan, those things don't appear to be indicated right now. It appears that a test is indicated, and for the type of an invention, coming to us at that stage, we would recommend a test.

Senator COCHRAN. This has been very helpful, and I think it completes the record of our hearing. It is an area of great interest to our subcommittee, and to me personally, and I thank you for coming and cooperating with us and presenting this information to us.

This concludes our hearing. The hearing will now adjourn for a demonstration of the machine in room G–50.

[Whereupon, at 12:45 p.m., the subcommittee was recessed, subject to the call of the Chair.]

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

Statement of

United States Representative

Thomas N. Kindness

Before the

Subcommittee on Energy, Nuclear

Proliferation, and Government Processes

July 30, 1986

Mr. Chairman, Members of the Subcommittee:

Thank you very much for allowing me the opportunity to appear before you today. I would like to commend the Subcommittee for holding these hearings on the issue of Mr. Newman's patent application.

As you are aware, I have introduced a private bill, H.R. 4081, that would grant to Mr. Newman the patent that he originally applied for in March of 1979. I should state at the outset that under normal circumstances I would defer to the expertise of the appropriate agency, in this case the U.S. Patent and Trademark Office, on a technical question such as this one. However, this is a case where extraordinary action is appropriate. One need only look at the convoluted, tortuous path that this case has taken to know that Mr. Newman has been denied the fundamental fairness and objectivity that is the right of every potential patent holder.

Without burdening the Subcommittee with a complete litany of all the abuses and inconsistencies that Mr. Newman has suffered at the hands of the PTO and the Courts, I would like to highlight the three major events that have made me willing to pursue the extraordinary measure of a private bill.

On March 13, 1982 Mr. Newman appeared before a high level Patent Office Committee consisting of Samuel Engle who acted as judge, Mr. Truhe and Mr. Miller (supervisors), and Mr. Dugan(patent examiner) and was told, "your invention works but your technical discription is inadequate." On September 30, 1982 Mr. Newman was told by the Board of Appeals of the PTO that, "Your technical discription is adequate but your invention doesn't work."

After these contradictory statements, Mr. Newman filed suit in Federal District Court and in August of 1984 a Special Master, William E. Schuyler, Jr. was nominated by the U.S. Patent and Trademark Office to evaluate the energy machine, since Judge Jackson stated that he did not feel personally competent to render such an evaluation. Mr. Schuyler is a former Commissioner of the PTO and is a highly qualified electrical engineer.

After evaluating the energy device Mr. Schuyler stated for the record, "Evidence before the PTO and this Court is overwhelming that Mr. Newman has built and tested a prototype of his invention in which the output energy exceeds the external input energy. There is no contradictory factual evidence." Although Rule 53 of the Federal Rules of Civil Procedure provides that the court "shall accept the findings" of the Special Master unless there is clearly erroneous evidence, the Court refused to accept the findings, yet did not identify any evidence that was clearly erroneous. Mr. Newman was charged $11,000 for the Special Master's evaluation.

On March 14, 1985 Judge Jackson continued to remand the case to the jurisdiction of the PTO and ordered Mr. Newman to turn his energy machine over to the National Bureau of Standards for further testing. After much delay and misunderstanding, NBS tested the device and declared that it did not work. The Subcommittee will have ample time to consider the reliability of these tests which a number of experts, including Dr. Roger Hastings, a physicist with Sperry Corporation, have found to be faulty. But it appears clear that had consultations been held with Mr. Newman the testing team might have had a better understanding of the principles at work and perhaps would have devised a more valid test.

These are only the highlights of the bureaucratic inertia that has plagued the Newman case from the beginning and I think its about time that some common sense be brought to bear on the issue, lest it languish another seven years.

When an issue has become so clouded and confused by the purported experts, shouldn't an inventor be given the benefit of the doubt so that the market-place can be given the opportunity to render its verdict? The device which Mr. Newman claims will revolutionize the energy industry would be open to investors who are fully aware of the lack of certainty regarding its utility. These hearings and the attendant press coverage could assure that it be made clear to the public that there are no guarantees. The fact that scientists for the government have found the device wanting could cause a stampede of

potential investors; but this enthusiasm could be dampened by a simple warning that the patent was issued, in part, due to the legal morass which prevented fair and objective evaluation of the device.

When reasonable men differ, as they have in this case, the final result should not be a decision by bureaucratic fiat but rather an accommodation should be reached that alows the device to rise or fall on its own merits. Human history is replete with examples of naysayers whose pessimism was later found to be comically unwarranted. A case in point is the former Director of the PTO, Mr. Charles H. Duell, who declared in 1899 that, "everything that can be invented has been invented."

The inordinately complex scientific facts and the ultimate benefit such a device would have for mankind mitigate against its being denied the real test of the marketplace. The technically competent former head of the PTO and Special Master in this case, Mr. Schuyler, said that a patent should be issued and in light of Judge Jackson's refusal to follow federal law with respect to the findings of such a Special Master, I believe Congress should step in and grant the patent; then the people can decide if it actually works.

Thank you again for this opportunity to testify.

TESTIMONY OF RENE D. TEGTMEYER,
ASSISTANT COMMISSIONER FOR PATENTS
BEFORE THE COMMITTEE ON
GOVERNMENTAL AFFAIRS
SUBCOMMITTEE ON ENERGY, NUCLEAR
PROLIFERATION, AND GOVERNMENT PROCESSES

UNITED STATES SENATE

JULY 30, 1986

Mr. Chairman:
Members of the Subcommittee:

It is my pleasure to testify before this Subcommittee on behalf of the Patent and Trademark Office. In my position as Assistant Commissioner for Patents, I am charged with administrative and supervisory authority over the Patent Examining Corps.

The patent system is almost as old as the Nation itself, the first patent law having been enacted in 1790. By enacting this and later laws, Congress in exercising its Constitutional power has given the Patent and Trademark Office authority to administer our patent system. The system has time and again proved its worth. Businesses and industries owe their existence to the availability of patents for new technology. Patents are, in addition, an important source of technical information to the public, and to the industrial and scientific communities.

The Patent and Trademark Office as a distinct bureau may be said to date from 1802, when an official in the Department of State, who became known as "Superintendent of Patents," was placed in charge of patents. It remained in the Department of State until 1849, when it was transferred to the Department of the Interior. In 1925, it was transferred to the Department of Commerce, where it is today.

The main functions of the Patent and Trademark Office are administering the patent and trademark laws as they pertain to the granting of patents and the registering of trademarks. The Office has no jurisdiction over questions of patent or trademark infringement or their enforcement, nor of matters relating to the promotion or utilization of patents or inventions.

The head of the Office is the Assistant Secretary and Commissioner of Patents and Trademarks. His staff includes the Deputy Assistant Secretary and Deputy Commissioner, several assistant commissioners (of which I am one), and other officials. As head of the Office, the Commissioner, subject to the approval of the Secretary of Commerce, exercises general supervision over the entire work of the Office, prescribes rules for the conduct of proceedings in the Office and for the recognition of agents and attorneys, decides questions raised in petitions, and performs other related and necessary duties.

The examination of patent applications is the largest and one of the key functions of the Office. This work is divided among 15 examining groups, each group having jurisdiction over certain

assigned chemical, mechanical or electrical technologies. Each group, headed by a group director, includes a number of suborganizations, called art units. Each art unit is responsible for a particular area of technology. An art unit is composed of examiners who review patent applications and decide whether patents can be granted. The level of authority given an examiner depends on his or her experience, training and performance on the job.

An art unit is so named because it is concerned with a specific or limited range of technology or technical art. For example, one chemical art unit is concerned with applications directed to heterocyclic organic chemistry, while a mechanical art unit handles applications for surgical instruments. An art unit comprises an average of 13 examiners.

While there are a substantial number of administrators, lawyers, scientists and other professionals, the bulk of our professional staff is made up of patent examiners. Our staff of 3,438 employees at the end of the last fiscal year included over 1,400 patent examiners. Each examiner handles patent applications directed to the field of technology in which he or she has been trained and is familiar.

The examining corps collectively examines applications in every technical field, ranging from relatively simple gadgets and toys to the newest developments in high polymer chemistry and solid state physics. The Patent and Trademark Office responds to the emergence of a new technology by creating or modifying the functions of a patent examining art unit, so that an invention may be

examined as promptly and thoroughly as inventions in established technical disciplines.

I emphasize that the patent system is not the private reserve of major corporations, nor has it ever been. Historical statistics indicate that individual inventors and small businesses receive a substantial portion of new patents. In fact, most fees charged by the Patent and Trademark Office are reduced by 50% for individuals, non-profit organizations and small businesses, to encourage their use of the patent system. Some 30 percent of all patent applicants qualify for these fee reductions.

We are very aware of the need to issue patents as promptly as possible, consistent with the obligation of reasonable assurance to the patent owner and to the business and technical communities of patent validity. During FY 1985, examiners reduced the chronic backlog of applications by disposing of more cases then we received. This was an important step in moving toward our goal of reducing patent pendency time to 18 months.

The average pendency time decreased during FY 1985 to 23.2 months. The inventory of patent applications decreased to 237,197 at the end of FY 1985. The average time needed to receive an initial response from the Patent and Trademark Office on the merits of a patent application decreased from 11.6 months to 9.5 months.

A total of 125,931 patent applications, including design patent applications, were filed in FY 1985, an increase of 7,946 from the number filed in FY 1984. During FY 1985, 75,302 patents were granted.

These statistics evidence quite clearly and dramatically the reliance of businesses and individuals on the United States patent system. They also show positive and effective Executive and Congressional cooperation in reducing backlogs and making the system an effective incentive to call forward new technology.

The patent examination system, of course, begins with the receipt in the Patent and Trademark Office of a patent application. Most are prepared by an agent or attorney qualified as a result of training and an examination to represent inventors before the Office. A small percentage of applications, however, are filed and prosecuted by inventors acting on their own (pro se inventors). For simplicity, the applicant's attorney or agent, or the applicant himself or herself, is referred to in my remarks as the applicant.

The application is given a serial number and filing date by the Office's mail room (the filing date can have important legal consequences in determining the right to a patent). It is then forwarded to an examining group for assignment to an examiner familiar with the technology. Applications involving classified subject matter receive special handling.

Applications, with a few exceptions, are examined in order of their receipt in the Patent and Trademark Office. These exceptions authorize earlier examination in such circumstances as the advanced age of the inventor, on-going infringement of the invention, reliance on the patent for investment decisions or the nature of the subject matter.

The examination of an application begins with a careful study of the application and its technical contents by the examiner to whom it has been assigned. The examiner determines exactly what the invention is alleged to be, and conducts a search of the Office records to see if the invention is the same as or obvious in view of the technology already described in earlier United States or foreign patents or other technical literature (known collectively as the prior art). The examiner also determines whether the invention has utility and whether it is clearly described in a way that teaches others how to make and use it. This initial examination is part of a process that involves an average of 18 hours of an examiner's time.

The examiner communicates his initial conclusions on patentability to the applicant. This communication (the first Office action) explains any reasons why the invention is unpatentable, citing and providing copies of any relevant prior art found in the search. Additionally, the first action points out any formal deficiencies in the application and, if possible, offers suggestions as to how the invention may be more precisely defined. It also identifies any problems with the completeness of the description and the utility of the invention. Other steps that can be taken to make the invention patentable, if any, are pointed out. A reasonable period is provided for a response from the applicant.

In a small percentage of cases, the first Office action indicates that the invention is patentable and that all formal requirements for the application are met. Accordingly, the application can be processed for the granting of a patent.

In the more typical situation, however, some or all of the claims are held unpatentable or the description found deficient, or both. The applicant must respond directly to the objections (for formal matters) and rejections (involving substantive issues of patentability) raised by the examiner. Responses may include amendments to the claims and arguments as to why the examiner's conclusions are wrong.

Often, the response involves the addition, amendment or deletion of claims. Claims are very stylized descriptions of the invention, each appearing as a single sentence at the end of the patent application. Their contents determine exactly the scope of patent protection. Most applications, therefore, include a range of claims from broad to specific, to assure complete patent protection. It is not necessary, however, to have more than one claim.

The applicant's response is placed in the file of the application, as is all correspondence between Office officials and the applicant. A permanent file is established in this way. The response is taken up in turn by the examiner for further consideration and evaluation of the applicant's arguments and evidence of patentability. The examiner, if needed, conducts an updating or further search of the prior art. Usually, however, the prior art already known to the examiner is relied upon.

An inventor generally conducts his or her own search of the prior art to decide if a patent application is worth filing and, if so, the scope of claims that have a reasonable chance of "being allowed" (found patentable). If such a preliminary search was

actually conducted, the applicant is required to provide to the Office any material information he finds. There is no requirement to conduct a preliminary search, however. The applicant is also required to provide the Office with any other material information of which he or she is aware bearing on the patentability of the invention.

If the applicant's response successfully disposes of all of the examiner's concerns over both formal and substantive issues, the application is processed for grant of a patent. On the other hand, the examiner and the applicant may reach an impasse over patentability. If so, the examiner sends a final rejection to the applicant explaining the Office's stance on the still-unresolved patentability issues. This final rejection closes the prosecution of the application. Only very limited matters may thereafter be raised by the applicant, in most cases only with the examiner's authorization. For a very small percentage of applications, the prosecution continues beyond the second (usually final) rejection, as when a further prior art search reveals new information or new facts become known to the applicant or the Office.

Interviews with examiners may be arranged, but an interview does not remove the necessity for response to Office actions within the required time. Office decisions are based entirely on the written record, although issues can be resolved by interviews.

At any stage of the prosecution and for any reason, the applicant may abandon an application. Usually, an application is abandoned because the applicant is convinced that he has no chance of

receiving a patent or because he has chosen to forego possible patent rights and rely on trade secrecy protection. An abandoned application file is kept secret, while a patent file is open to the public. About one out of every three patent applications is abandoned.

An application will also be abandoned if the applicant fails to reply during the period set for reply to an Office action or other Office requirement. An applicant can under special circumstances (e.g., when the delay in replying to an Office action is unavoidable) revive an abandoned application. All patent rights in an application end with its abandonment, unless revived.

The other two-thirds of patent applications are issued as patents. A notice of allowance is sent to the applicant and a fee set for printing the patent.

An applicant dissatisfied with the final rejection of some or all of the claims in the application or otherwise in disagreement with the examiner over issues of patentability may appeal to the Board of Patent Appeals and Interferences (formerly the Board of Appeals). An appeal is normally heard by three Board members, although an enlarged panel can be convened to hear cases of special importance or difficulty. An oral hearing may be obtained by the applicant upon payment of a fee, or the applicant may choose to allow the Board to rely on the examiner's answer (brief) and his own brief. Disagreement over a procedural or formal matter is handled by an applicant's petition to the Commissioner.

As an alternative to appeal, in situations where an applicant desires consideration of different claims or further evidence, a continuation application may be filed. Filing a continuation requires payment of another filing fee. A continuation application may, in fact, be filed at any time during the pendency of the application it replaces. The continuation application is entitled to the earlier filing date of the original application for subject matter common to both.

If the decision of the Board of Patent Appeals and Interferences is still adverse to the applicant, an appeal may be taken to the United States Court of Appeals for the Federal Circuit or a civil action may be filed against the Commissioner in the United States District Court for the District of Columbia. The Court in the appeal will review the record made in the Office and may affirm or reverse the Office's action. In a civil action, the applicant may present new evidence or testimony to the Court for consideration in deciding patentability.

Once a patent is granted, it is outside the jurisdiction of the Office except in certain circumstances. The Office may issue without charge a certificate correcting its clerical error in the patent. Minor typographical errors made by the applicant may similarly be corrected upon payment of a charge. If the patent is defective, the patentee may apply for a reissue patent. A reissue patent replaces the original patent and is enforceable only for the balance of the unexpired term of the original patent. The nature of the changes that can be made by reissuing a patent are fairly limited. New matter cannot be added.

A member of the public or the Commissioner may institute a reexamination by the Office to question the validity of a patent. This proceeding, based on newly-discovered prior art, is available upon payment of a fee to anyone concerned about a patent. The proceeding is conducted entirely ex parte, however.

The patent term is 17 years from its grant. Maintenance fees are due 3 1/2, 7 1/2 and 11 1/2 years after the original grant. Maintenance fees must be paid at these stipulated times to keep the patent in force. After a patent expires, anyone may make, use or sell the patented invention without the patentee's permission, provided that subject matter covered by unexpired patents is not used. The patent term may not be extended except by special act of Congress.

An application includes a specification (a written description of the invention and at least one claim), an oath or declaration, a drawing (if a drawing is possible) and the filing fee.

The oath is the inventor's statement that he believes himself to be the first and original inventor of the claimed invention, along with certain other allegations required by law. It is signed by the inventor or inventors.

The specification includes a written description of the invention and of the manner and process of making and using it. The specification must be in such full, clear, concise and exact terms as to enable any person skilled in the technological area to make and use the invention as claimed. The specification must

describe a complete specific embodiment of the invention and the best mode contemplated by the inventor of carrying out the invention.

Models were once required to be submitted with all patent applications. They are not now required except in extremely rare cases, since the description of the invention in the specification and drawings must be sufficiently full, complete and capable of being understood without the aid of a model. A model or other physical exhibit, however, may be required by the Office if deemed necessary. It may be called for in the case of an application directed to an alleged perpetual motion device. However, models will not be admitted unless specifically requested by the examiner.

The patent laws authorize the patenting of any new and useful process, machine, manufacture or composition of matter, or any improvement thereof. The term "useful" refers to the condition that the subject matter in question has a useful purpose, and includes operability. A machine that will not operate to perform its intended purpose is not useful, as is the case with alleged perpetual motion machines.

If the asserted utility of an invention is believable on its face to persons skilled in the art in view of contemporary scientific knowledge, the burden is then upon the examiner to establish a reasonable basis for doubting the utility or operability of the invention. On the other hand, statements of operability deemed unlikely to be correct by one skilled in the

art in view of contemporary knowledge will require adequate proof on the part of the applicant. Long-standing judicial decisions, e.g. Ex Parte De Bausset, 43 O.G. 1583 (1888), copy attached, obligate the examiner to raise the issue of utility or operability in cases in which known physical laws are disregarded. Ex parte statements or theoretical arguments in reply to an examiner's prima facie holding of inoperability are not sufficient. The applicant must prove operability such as by affidavits of experts, applicant's tests or submission of a model where required.

An invention to be patentable must also be new, as defined in the patent law; i.e., different from the prior art. Patent law section 102 identifies the items and acts that destroy the novelty of an invention and, hence, preclude its patenting. An inventor must be careful not to destroy the novelty of his own invention. If the inventor describes the invention in a printed publication, or uses the invention publicly, or places it on sale, he must apply for a patent before a one-year grace period has gone by. Otherwise any right to patent is lost.

Even if the subject matter sought to be patented is not exactly shown by the prior art, but involves one or more differences over the most nearly similar prior art, a patent may still be refused if the differences would be obvious. The subject matter sought to be patented must be sufficiently different from what has been used or described before so as to be unobvious to a person having ordinary skill in the area of technology related to the invention. For example, the substitution of one material for another or changes in the sizes of parts are ordinarily not patentable.

Quite obviously, patent law and the administrative procedures governing the examination of patent applications are far more detailed and complex than my remarks indicate. These comments should, therefore, be regarded as only an introduction to the functioning of the patent system.

The patent examination system depends for its effective functioning on the dedication and talents of the Patent Examining Corps and the resources available to it. We are proud of our examiners. They are all engineering or science graduates. Many are honor graduates, and a substantial number hold graduate degrees. Some 300 are, or are training to become, lawyers.

All entering examiners study at the Office's Patent Academy before assuming any examining duties. After an introductory course and assignment to an art unit, they begin examining cases under the supervision of an experienced examiner or the examiner with supervisory authority over the art unit. An examiner is assigned to an art unit whenever possible on the basis of his experience, interest and training in the technology with which the art unit is concerned. Thereafter, examiners receive extensive training in patent law and procedures in Patent Academy courses throughout their first year of examining. The prestige of the Patent Academy is such that private sector professionals in patent law firms and corporate patent departments, both foreign and American, pay the fee to attend. Examiners are also given or sent to legal and technical training courses. To enhance additionally the effectiveness of the examination process, the Office in 1982 began a program to provide opportunities for examiners to visit industrial

facilities where the technology in which they specialize is developed and used.

Our quality control office is specifically charged with the review of newly issued patents to assure the continuing quality of examination. About 4% of issued patents, selected on a random basis, are thoroughly reviewed each year by this office. Last year, 222 cases out of 3,251 reviewed under the program were reopened for further examination.

An on-going quality reenforcement program addresses deficiencies in Office practices that may detract from over-all examination quality. Some matters called to the attention of the program's staff by patent practitioners or PTO personnel include the incompleteness of examiners' rejections of claims, final rejection practices and appeal practices.

Another indication of the quality of examination is the relatively high proportion of affirmances of Office decisions by the United States Court of Appeals for the Federal Circuit. Last year, in over three-fourths of the cases decided on the merits, the Office position was affirmed.

The completeness of the patent search file is obviously critical to the reliability of issued patents. Examiners conduct searches in a file containing over 27 million documents. Over 600,000 new documents are added each year. These documents are classified and stored in 115,000 different areas of technology. The search files are all paper and difficult to maintain, however. At any time,

some 7% of the most important documents in the file are missing or misfiled. A paper search file of this size is difficult, if not impossible, to maintain without integrity problems.

For these reasons, the Office is automating the search file. The automated system, due to be completed in 1989, will cure the lack of complete file integrity and provide new search tools to examiners to improve the quality and reliability of patents.

Periodically, selected portions of the search file are reviewed to determine the need for new classifications that better correspond to the state of technology. These reclassification programs constitute an analysis of all patents in a given technology. The Office then restructures the classification system for the new technology to increase the access to and the reliability of the patent search file. The FY 1985 reclassification programs established 3,166 new subclasses, involving 429,627 United States and foreign patents.

Examiners also have available for searching and rely on the resources of the Patent and Trademark Office's Scientific Library. It accesses over 250 scientific and technological data bases, with 70-90 data bases each for chemical, electrical and mechanical arts. Its automated on-line catalog, microfilm collections and stacked books provide additional extensive resources. Experts in information retrieval are available to assist examiners. Patent examiners also make extensive use of on-line patent and technical commercial data bases in examining applications.

I turn now to Joseph Newman's particular application, but must limit myself to a discussion of its chronology. Not all of his application file is publicly available. Parts remain subject to the confidentiality obligations imposed by the patent law. Also, it would be improper for an Office official to comment publicly on the merits of a pending patent case.

On August 18, 1980, Mr. Newman filed an application for a patent on his invention of a method and apparatus for obtaining more energy from a machine than is put into it. This application is related to several earlier filed applications, all since abandoned by Mr. Newman.

A patent examiner refused to issue a patent to Mr. Newman, based on a determination by the examiner that Mr. Newman's disclosure was not sufficient to permit a person skilled in the technology of the invention to make and use it, as required by patent law. Mr. Newman appealed the examiner's refusal to the Board of Appeals of the Patent and Trademark Office. In its decision of November 5, 1982, the Board sustained the rejection of the examiner. The Board concluded that while the disclosure in Mr. Newman's application was sufficient to enable one skilled in the art to construct a motor, such a motor would not and could not be made to operate at an efficiency level of greater than 100%. The Board appended to its decision a copy of an article from the January 1968 issue of Scientific American (copy attached) explaining why machines of this type will not work.

On January 3, 1983, Mr. Newman filed a civil action in the United States District Court for the District of Columbia, one of the two

courts in which an applicant dissatisfied with a decision of the Board of Appeals may seek judicial review. The District Court on August 15, 1984 referred the matter to a master, former Commissioner of Patents William E. Schuyler, Jr. In draft findings on September 28, 1984, Mr. Schuyler stated that there was overwhelming evidence that Mr. Newman had built and tested a prototype of his invention in which the energy output exceeded the external input energy. Furthermore, Mr. Schuyler concluded there was no contradictory factual evidence. After Mr. Schuyler's report was filed with the Court, the Court ordered a second examination of the application by a different examiner in light of the draft findings. This examiner also rejected the claims in the application and requested production of a model for testing. These results were forwarded to the Court as ordered.

On June 11, 1985, Judge Thomas P. Jackson of the United States District Court for the District of Columbia held that the master's report was clearly erroneous to the extent that it found that there was no genuine issue of fact with respect to the operability of the device. In support of his holding, Judge Jackson relied among other things on the laws of thermodynamics, a report from the Mississippi State University, and the action of the second patent examiner. Judge Jackson also ordered Mr. Newman to produce his invention for testing at the National Bureau of Standards (NBS).

Mr. Newman asked the Court of Appeals for the Federal Circuit to set aside Judge Jackson's order. On January 13, 1986, the Court of Appeals ordered Mr. Newman to produce his device for testing

at NBS, subject to certain conditions. Mr. Newman delivered a device to NBS on January 24, 1986. On June 26, 1986, NBS delivere its report to the District Court, the Patent and Trademark Office and Mr. Newman. The Report concluded that the device does not function as alleged in the patent application. The NBS Report stated "At all conditions tested, the input power exceeded the output power. That is, the device did not deliver more energy than it used." A copy of the NBS Report is affixed. A trial has been set for December 8, 1986.

This concludes my testimony. I would be pleased to answer any questions.

EX PARTE DE BAUSSET.

Decided June 16, 1888.

43 O. G., 1563.

1. UTILITY.

The Office is bound to raise the question of utility of an alleged invention in cases where natural laws and established principles are disregarded, for the reason that the law does not authorize the grant of letters patent except for novel and useful inventions. In such cases, even if novelty were admitted, a patent would be withheld until applicant should demonstrate the operativeness of his device. *Ex parte* statements or theoretical arguments are not sufficient; applicant must prove by practical demonstration his assertions.

2. SAME.

The patent system was not designed to protect the chimerical schemes of visionaries or closet theorists. Invention consists in more than the work of the imagination. To conceive of a scheme of vast dimensions is the work of a dreamer; to make the mathematical computations requires the ordinary knowledge of the student; to face the difficulties of construction and devise means to overcome them is the true work of the inventor.

APPEAL from Examiners-in-Chief.

STATEMENT.

APPLICATION of Arthur de Bausset, filed March 11, 1886, No. 194,910.

Messrs. Dyrenforth & Dyrenforth for the applicant.

HALL, *Commissioner:*

This application was formally rejected by the Primary Examiner for want of operativeness, that being the only question involved in such action of the Office. Upon appeal the decision of the Examiner was affirmed by the Examiners-in-Chief. Thereupons pplicant appealed to the Commissioner. The case was referred to and heard by the Assistant Commissioner, who reversed the action of the Examiners-in-Chief upon the record as it then stood. The attention of the Commissioner having been called to the matter, and it having been suggested that other questions of merit were present in the case which had not been involved in the previous action of the Examiner, the application was remanded to the Primary Examiner with direction "to examine the application on its merits and allow or reject the case as his judgment may determine." The Examiner, regarding this direction as an authority to treat the case *de novo*, went more at length into the question of operativeness, and also based the rejection, which he again made, upon certain references which had been before cited. The case was again appealed to the Examiners-in-Chief, who affirmed the decision of the Primary Examiner, and it is now before the Commissioner on appeal from the decision of the Examiners-in-Chief.

The references are the following patents: Abruzzo, July 21, 1868, No.

89,107; Emsley, April 17, 1883, No. 276,012; Hamon, October 5, 1886, No. 350,303.

In support of the reasons given by the Examiner for holding the device inoperative the following publications are referred to: *Strength of Materials*, Thomas Box, London, E. & F. N. Spon, 1883, pp. 448 and 449; *Steam Boilers, their Construction and Management*, W. H. Shock, New York, Van Nostrand, 1880, sec. 13, p. 351; *Appleton's Dictionary of Mechanics*, New York, D. Appleton & Co., article, "Boring Mills;" *Natural Philosophy*, D. Olmsted, New York, Collins & Bro., 1849, pp. 123, 128, and sec. 198; *Encyclopedia Britannica*, Boston, Little, Brown & Co., 1875, article, "Aeronautics;" *Mechanic's Almanack*, 1880–1885, Calvert, London, J. Heywood, 1886, p. 39, Fig. 9, p. 41; *History and Practice of Aeronautics*, J. Wise, Philadelphia, Joseph A. Speel, 1850.

The claims are as follows:

1. An air-ship comprising, in combination, a hollow metallic body and a pneumatic pump or pneumatic pumps for producing a vacuum therein, whereby the ship may be caused to rise, substantially as described.

2. An air-ship comprising, in combination, a hollow metallic body, a pneumatic pump or pneumatic pumps for producing a vacuum therein, and a car attached to the hollow metallic body, substantially as described.

3. In an air ship, a metallic cylinder constructed substantially as described, provided with a pneumatic pump or pneumatic pumps and pointed or cone-shaped ends, substantially as described.

4. In an air-ship, a metallic cylinder provided with a pneumatic pump or pneumatic pumps, pointed or cone-shaped ends, and electrical apparatus for operating the same, substantially as described.

5. In an air-ship, a metallic cylinder provided with a pneumatic pump or pneumatic pumps, pointed or cone-shaped ends, and a spring-support for the points, substantially as described.

The first claim defines nothing but an air pump, viz, a hollow metallic body and a pneumatic pump or pumps for producing a vacuum therein. The fact that it is called an "air-ship," and that by creating a vacuum in the metallic body the ship may be caused to rise, are mere statements of results and not of construction. The same statement may be made of the third claim, except that the air-pump is constructed with cone-shaped ends; but it would be none the less an ordinary air-pump.

Applicant's conception is that a vessel constructed of metal of sufficient dimensions and with the atmosphere exhausted may possess a sufficient degree of levitation by means of displacement to float in the atmosphere. The construction and relation are precisely identical with those of the submarine diving-boats, from which the water is either pumped or originally excluded, and the levitation controlled by the admission of more or less water or its expulsion, the only difference between the two being that in the one case the atmosphere is pumped out or allowed in as the aeronaut desires to rise or descend, while in the other the water is pumped out or allowed ingress as the navigator desires to rise or descend in the water.

The patent to Abruzzo clearly shows an air-ship consisting of a hol-

low metallic body and pumps by which the metallic body may be exhausted, and having a car attached to the said body—in other words, all the elements called for in the first two claims of applicant. In Abruzzo's cylinder there appears only one end cone-shaped, while in applicant's third claim both ends are cone-shaped; but it is obvious, as suggested by the Examiner, that there is no invention in making the second end of the vessel of the same shape as the first.

Claim 4, covering a combination the same as the previous claims, with the addition of an operating apparatus, is also anticipated by Abruzzo, and the fact that applicant operates his apparatus with electrical force or machinery gives it no patentability over and above what is disclosed by Abruzzo.

In claim 5 is found the device of a spring-buffer at the extreme point of the cone-shaped end. Spring-buffers are shown in the reference, differently located, it is true; but undoubtedly a mere change in the position of the buffer to a location where it is thought to be more desirable or useful involves no invention.

Applicant proposes to build an air-ship in cylindrical form which he prefers to make about 414 feet long and about 141 feet in diameter, with a cone and prow 120 feet long at each end. The length over all is therefore 654 feet. This vessel is constructed of steel plates one forty-fourth of an inch thick, riveted together and to steel ribs inside. These ribs are placed about 9 feet apart, and are one and one-fourth inch wide by one-eighth of an inch in thickness. This vessel is not to be inflated like an ordinary balloon, but is to be exhausted of air until it becomes buoyant enough to support the vessel itself and its attachments, consisting of a car for its load, propelling and steering machinery, and pumps for exhausting the vessel as necessity may require. In addition to these light ribs there are interior supports and compartments, and the ribs are particularly set forth as intended to prevent collapse. Applicant has gone into elaborate computations as to the weight of such a cylinder and its appurtenances to show its buoyancy and sustaining power under ordinary atmospheric conditions.

The Examiner has denied both the novelty and utility of the alleged invention, and has been fully sustained by the Examiners-in-Chief. There is nothing in any of the claims that is not fully met in the references cited, in which are found the vessel of the same shape as applicant's, pumps for exhausting the air therein, and propellers worked by an electric motor. The idea of using a metallic vessel exhausted so as to be buoyant in the atmosphere is shown to be over two centuries old, so that it appears that there is not a single novel idea embraced in the claims presented.

But apart from these references the Examiner has given unusual attention to the reasoning by which applicant attempts to support his hypothesis. His answer to the reasons of appeal demonstrates the fallacies of applicant's argument, and, in our present knowledge of natural

laws, is to my mind unanswerable. He observes that in structures showing some analogies to that proposed an enormous internal bracing has been found necessary in order to enable them to resist a much slighter comparative outside pressure than that upon applicant's cylinder. Such structures are the outcome of the highest engineering skill of the day. They have been planned with careful regard to the tested strength of materials and proportion of parts, and are employed under conditions of stability as remote as can be conceived from those of applicant's cylinder. The force of such illustrations is not to be overcome by closet theorists nor by mathematical computations, however minute, that ignore established natural laws. The record shows no attempt to overcome such objections. The legitimate and unavoidable conclusion reached by the Examiner is that to enable the structure to sustain its weight, even prior to the exhaustion of air, it must be supported by enormous bracing, such as is seen in the iron roof of a railway depot or the hull of an ocean steamer. Such bracing by its weight must overcome all the buoyancy the cylinder can derive from the exhaustion of air from its interior, and without such bracing its collapse (even supposing it is built) is as inevitable as the laws of nature. It can not be built; but supposing the difficulties of building it were overcome, it would be incapable of use. Under the circumstances, even if novelty were admitted, it must be held that a patent must be refused, at least until applicant practically demonstrates the operativeness of his device. The patent system was never designed to protect the chimerical schemes of visionaries. Invention consists in more than the work of the imagination. Applicant has only carried his conception up to the point where invention must begin. To conceive of a scheme of vast dimensions is the work of a dreamer; to make the mathematical computations requires only the ordinary knowledge of the student; to face the difficulties of construction and devise means to overcome them is the true work of the inventor, and it is in these means that the invention must consist, where others in the same field have failed.

It is not true that one who simply conceives an invention may obtain a patent if he has never completed such invention or demonstrated beyond a doubt that it is capable of successful operation. (*Gardner* v. *Dudley*, C. D., 1880, 123.)

An imperfect and incomplete invention, resting in mere theory or in intellectual motion, or in uncertain experiments, and not actually reduced to practice and embodied in some distinct machinery, apparatus, manufacture, or composition of matter, is not patentable. (*Draper* v. *Potomska Mills Corp.*, 13 O. G., 276.)

Patents are granted only for inventions which possess novelty and utility. The last consideration is rarely raised, since it is generally held that unless a device is actually harmful in some way its utility need not be questioned. But this does not cover the whole ground.

Whether an invention is useful in the sense of the patent laws is not whether it is mischievous or hurtful or frivolous or insignificant, but whether it is capable of use for a purpose from which some advantage may be derived. (*Crouch* v. *Speer*, 6 O. G., 187.)

To constitute utility, it must be a practical method of doing the thing designed. (*Roberts* v. *Ward*, 4 McL., 585.)

The Office is bound to raise the question of utility in cases in which known laws and established principles are disregarded.

When, as in this case, the universal law of gravitation must be ignored in one portion and doubled in another in order to make the device operative, the question as to whether it is "sufficiently useful and important" is pertinent. (*Ex parte Smith*, C. D., 1873, 139.)

When the question of operativeness is raised in cases of this character it is not to be resolved by *ex parte* statements or by theoretical argument. The applicant must overbalance the opposing reasons in the judgment of the tribunals having jurisdiction of the case.

These reasons may be suggested by the laws of nature or by the testimony of witnesses. In case of evident conflict between the two the former must of course prevail. (*Ex parte Winterlich*, C. D., 1879, 240.)

The Office is particularly bound to take notice of the question of utility, because the law does not authorize the grant of patents except for useful inventions, and the fact of a grant is an assurance to the public of the conclusions of the Office in this respect as well as in respect to novelty.

The patent is *prima facie* evidence of utility. (*Vance* v. *Campbell*, 1 Fisher, 483; *Wayne* v. *Holmes*, 1 Bond, 27; *Lee* v. *Blandy*, 1 Bond, 361; *Tilghman* v. *Werk*, 1 Bond, 511.)

The Office can not be too careful on this point. Cases are not unknown where patents have been secured by a technical compliance with Office requirements, and then used simply to impose on a public not disposed to scrutinize closely the merits of a matter upon which the Patent Office has set the seal of its approval.

The present case deals with ideas long exploded and proposes not a single step in advance of what has long been known. It differs from former schemes only in its gigantic proportions. This cylinder is to be as long as the Capitol, and its diameter equals the width of one of our great avenues. These dimensions may seem to the visionary to demonstrate the greatness of applicant's conception; but it is great in no other respect. Applicant has not only struck out no new track, but confesses that there has been no attempt even at reduction to practice.

I am aware that it is settled by the authorities in the Office that when there is a reasonable doubt as to the utility of an invention it is to be resolved in favor of the applicant. That rule may be applicable either when applicant has made no attempt to reduce to practice, but relies upon a statement and description of his invention, or when he claims that he has substantially reduced it to practice; but in either event it must be a matter of reasonable doubt.

In this case I am not satisfied that there is even a doubt. Indeed, the opinion of all the experts in the Office who by education and experience are qualified and competent to give this subject careful and scientific investigation is unanimous that it is wholly impracticable and impossible to construct such an air-ship.

The decision of the Examiners-in-Chief is therefore affirmed.

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PERPETUAL MOTION MACHINES

Over the past 400 years numerous inventors have proposed marvelous ways of getting something for nothing. All these proposals have foundered on either the first or the second law of thermodynamics

by Stanley W. Angrist

The interwoven tapestry of history sometimes displays odd relationships. Who would think, for example, that two medical men would be leading figures in the history of efforts to make a perpetual motion machine? One of them, the 17th-century English physician Robert Fludd, is usually mentioned as one of the first to propose a perpetual motion machine to do useful work. The other, the 19th-century German physician Julius Robert Mayer, was among those who established as a law of nature the conservation of energy, which dooms proposals such as Fludd's.

The notion of getting something for nothing that underlies all speculations about perpetual motion is as old as Archimedes and may be a good deal older. In classical times, however, there was a tendency to depend on supernatural power sources. A more down-to-earth approach to the subject grew out of economic considerations as the first labor-saving machines, in particular water mills, spread across Europe. Originally used to grind flour, water mills evolved rapidly in later Roman times. Although they were never especially popular in the Mediterranean area, quite the opposite was the case in western Europe. By A.D. 400 water-driven flour mills and saw-mills were common in France. Twenty years after the Norman Conquest some 5,600 water mills were operating in 3,000 English communities, and before the end of the 14th century in England waterpower had been harnessed not only to grind flour and saw wood but also to tan leather, to full woolens and to grind pigments for paint. Soon almost every English manor that was situated on a stream—roughly a third of all the manors in the Domesday Book—had its own mill. Elsewhere floating mills were anchored in rivers and tidal mills stood in estuaries.

Villagers and townspeople who had no access to running water naturally sought alternative sources of power. One result was the windmill, a thoroughly practical invention. A less practical result was a series of proposals for closed-cycle water mills such as the one that Fludd put forward in 1618. The proposal must have seemed sensible enough at the time. If the water that turns a mill wheel could be collected from the race at the foot of the wheel and somehow put back into the reservoir above the wheel, the need for a source of running water would disappear. Centuries of experience had shown that mill wheels could turn big grindstones or raise heavy hammers. Why couldn't the wheel also drive a pump that would recycle the mill's water supply? In Fludd's day there was little reason to deny this possibility.

The same was true half a century later, when John Wilkins, Bishop of Chester and an early official of the Royal Society, put forward his views on the subject. In the 1670's Wilkins envisioned three natural power sources that might be harnessed to provide perpetual motion. These, in his words, were "Chymical Extractions," "Magnetical Virtues" and "the Natural Affection of Gravity."

Wilkins' third power source embraces the entire family of overbalanced wheels; that is, wheels that turn because they are perpetually heavier on one side than the other. He specifically mentioned only one formula for chemical extraction; its underlying concept may have arisen from a misunderstood observation of the ceaseless motion of small particles visible in a fluid that we know as Brownian movement. Wilkins also designed, but almost certainly never tried to build, a machine to utilize magnetic attraction. At no point, however, did he suggest a way of obtaining useful work out of the proposed perpetual motions.

As can be judged by Wilkins' leading role in the scientific community, speculation on perpetual motion machines was not yet considered a crackpot activity. Robert Boyle recounted in detail his examination of a fluid, compounded of bituminous oils and similar ingredients, that an engineer of his acquaintance had prepared as a charge for fire bombs. The engineer had mixed the ingredients over a fire and was surprised to find that days after the pot had been left to cool the fluid in it still swirled about. Keeping the pot in his laboratory for a time, Boyle observed that the oilier constituents of the fluid continued to stream, alternately spreading across the surface and then sinking out of sight. Again he made no proposal for harnessing the motion.

How was the tolerant attitude of early scientists toward perpetual motion transformed into today's skepticism? Clearly we now have far more theoretical knowledge and can make much more refined devices such as bearings, linkages and heat exchangers. Cannot this combination of talents close the apparently tiny gap between the designs of earlier times and the construction of actual working models? The answer, of course, is an emphatic no. For a perpetual motion machine to function, whatever its design, would require that it violate either the first or the second law of thermodynamics.

The first law of thermodynamics—the principle of energy conservation that Mayer helped to formulate—can be stated in various ways. One way of putting it says that a fixed amount of mechanical work always gives rise to the equivalent amount of heat. Thus energy can be converted from work into heat, but it can neither be created nor destroyed. There are more complex formulations of the first law but all eventually arrive at the

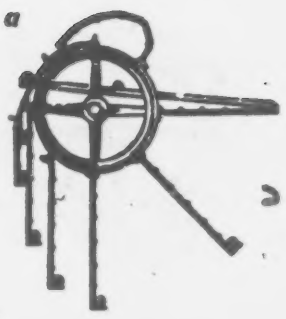
same conclusion: The total energy of the universe is constant.

Even before Mayer, pioneer studies of heat phenomena by the Scottish chemist Joseph Black and the American-born Count Rumford had helped to clear the way for deeper understanding. Black established the vital distinction between heat (as a quantity of something) and temperature (as an index of heat's intensity). The interrelationship of heat, energy and temperature is a complex one that can be explained by an analogy. After rain falls into a lake it is no longer rain but simply water; after heat is transferred to a body (because of a temperature difference between the cool body and its warm surroundings) it is no longer heat but simply energy. If the lake has no outlets, the rain raises the water level; if the body cannot get rid of energy, the heat transfer adds to its total energy and thereby raises its index of heat—its temperature.

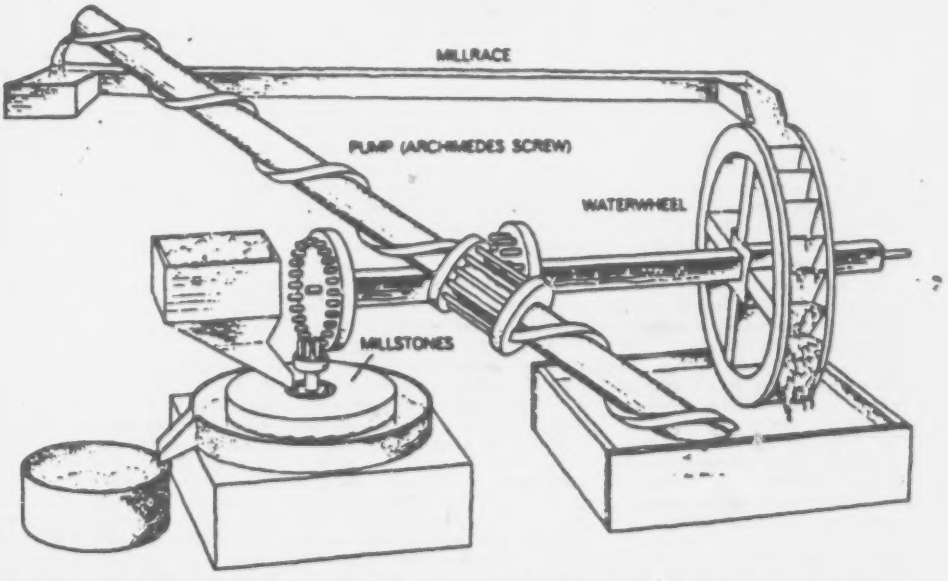
In Black's time variations in temperature and energy were attributed to the presence or absence of the intangible fluid called caloric. Rumford, in turn, struck a death blow to the concept of caloric with his experiments in a Bavarian cannon foundry. Bringing water to a boil solely with the heat generated by the boring of a cannon barrel, he concluded that the heat was due to friction. This was the first demonstration of the connection between heat and work, but it was soon confirmed by Humphry Davy's experiment in which the rubbing together of two pieces of ice was shown to produce heat. It was a number of years, however, before the equivalence of work and heat was determined with any precision.

This brings us up to Mayer. In 1840, when he was 27, Mayer sailed from Rotterdam as ship's physician on the schooner Java, bound for the East Indies. Although it is doubtful that he knew anything about Black's work or Rumford's, he had brought along Antoine Laurent Lavoisier's treatise on chemistry, and he soon became fascinated by Lavoisier's suggestion that animal heat is generated by the slow internal combustion of food.

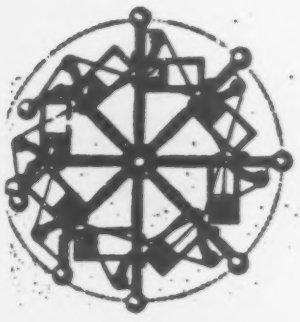
When the Java reached the East Indies, 28 of its crew were ill with fever. The treatment for fever in those days was to bleed the patient, and when Mayer did so, he observed that the crewmen's venous blood was bright red rather than the normal dark red—almost as red as arterial blood. Now, men of Lavoisier's comments was that, when the body is in warm surroundings, less internal combustion is required to keep it warm than when it is in cold ones. In support of this view he and others pointed to variations in the color of venous blood. Mayer concluded that his po-



OVERBALANCED WHEELS have been the most common prime movers of perpetual motion machines. Just as the water's weight overbalances a mill wheel and makes it turn, so various means of apparently adding weight to one side of a wheel were expected



CLOSED-CYCLE MILL was proposed by the English physician Robert Fludd in 1618 as a source of perpetual power in areas that lacked streams. The fact that such devices could not work because they required a violation of the principle of energy conservation, formally known as the first law of thermodynamics, was not recognized by the scientific community until two centuries after Fludd.



c

d

to move the four machines shown above. The first device (a) was reported to turn when jointed arms, with weights that rolled to their ends, were extended on one side; actually the wheel remains exactly balanced, whether or not the arms are extended. A much more complex wheel (b) was designed with the same objective. Like a, however, it is actually in balance in spite of its shifting weights. A pair of lungs within a water-filled drum were reported to move weights that would overbalance the next device (c). Finally (d), a starkly simple design reflects the inventor's conviction that his overbalanced wheel rim would spin between two rollers in spite of its lack of any support. These engravings and four on the following pages appeared in early issues of Scientific American.

tivists' venous blood looked like arterial blood because, like arterial blood, it had a high content of oxygen. It seemed that in the tropical East Indies the crewmen's bodies did not consume as much oxygen as they did in cooler latitudes.

At this point Mayer went a step beyond Lavoisier to conjecture that the body heat evolved by the metabolism of food should be exactly balanced by a combination of two opposing factors. These were, first, the heat lost by the body to its surroundings and, second, the work the body performed. Mayer was soon saying that heat and work are merely different manifestations of energy (which he called "force"), and that the two manifestations are equivalent.

The young physician was not able to obtain experimental proof of his conjecture; he lacked both money and laboratory facilities. He did, however, analyze data collected by other investigators on the specific heat of air, and he managed to calculate a numerical relation between heat and units of mechanical work. In effect he had determined the mechanical equivalent of heat. He offered an account of his work to the foremost scientific journal of his day, *Annalen der Physik und Chemie*, but it was refused. In 1842 a revised account appeared in another journal, and Mayer's version of the first law of thermodynamics was formally put forward. "Once in existence," he wrote, "force cannot be annihilated; it can only change its form."

James Prescott Joule, the son of a prosperous English brewer, was born four years later than Mayer. Joule studied chemistry in Manchester with John Dalton, but soon he developed an enthusiasm for experiments in electricity and electromagnetism, a field in which he was largely self-taught. In the early 1840's he carefully measured the amount of work required to raise the temperature of a pound of water from 60 degrees Fahrenheit to 61 degrees. Joule announced his result in 1843: the amount of mechanical energy required was 838 foot-pounds. In later years he refined this figure to 772 foot-pounds, a value remarkably close to today's standard (778.16 foot-pounds).

Joule had thus quantified the relation between work and heat that Mayer had propounded. Four more years were to elapse, however, before a third young investigator, Hermann von Helmholtz, convinced the international scientific community that the first law was a valid generalization. In 1847, when he was 26, Helmholtz presented his formulation of the first law before the Physical Society of Berlin in a paper titled "On the Conservation of Force." He began his analysis by declaring that perpetual motion machines were axiomatically impossible. In physics, as in mathematics, axioms are distinct from theorems. A theorem is a conclusion that is logically deduced from an axiom. An axiom does not require logical proof. The validity of a physical axiom can be based instead on repeated observations of nature. Thus Helmholtz did not need to prove his axiom; it was enough to point out that no one had yet built a successful perpetual motion machine. Helmholtz observed further that he was not alone in his view. Nicolas Léonard Sadi Carnot, an early student of the theoretical basis for the steam engine, had started with a similar axiom and had reached a number of significant conclusions concerning the dynamics of heat. As we shall see, Carnot's work, particularly his 1824 study "Reflections on the Motive Power of Heat," forms the basis of the second law of thermodynamics.

Proceeding from his axiom, Helmholtz next showed that the failure of perpetual motion machines led logically to the conclusion that energy is always conserved. He went on to demonstrate that both heat (regarded as small-scale motion) and work (regarded as large-scale motion) were forms of energy and that what was conserved was the total of the two forms rather than either heat or work taken separately. Helmholtz showed that the findings of Joule's experiments were in general agreement with calculations of the kind made by Mayer. Like Mayer, Helmholtz submitted his paper to *Annalen der Physik und Chemie*, and it too was refused.

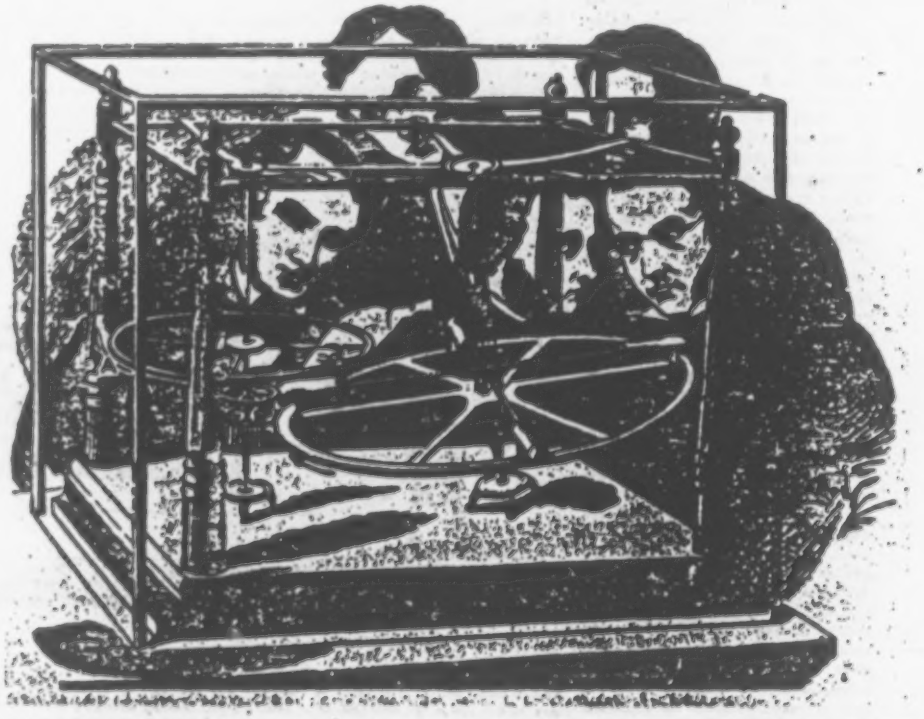
I have given this brief history of the first law because it is the law that most would-be inventors of perpetual motion machines attempt to evade. Their expectation is that more energy can be wrung out of some device incorporating falling or turning bodies than is required to restore the device to its original state. Curiously one of the most persistent proposals is Fludd's closed-cycle water mill. As late as 1871 an American patent attorney noted with some asperity that inventors submitted one or another vari-

ation on Fludd's mill to him every year, inquiring whether the concept was yet possible. Over the years, however, devices that depended for their power on overbalanced wheels gradually abandoned running water in favor of ingenious weight-shifting systems.

Many inventors have preferred power sources more sophisticated than the overbalanced wheel. Both early and late they have turned to magnets, at first natural magnets and then electrically powered ones. Bishop Wilkins' design for a magnetic device depended on a lodestone, which was to be strong enough to pull an iron ball up a ramp. Just before the ball had climbed all the way up to the lodestone, it would drop through a hole and roll back down a curved second ramp. The ball would then pass through a door and reach the first ramp again, where it would resume its upward journey. It is easy enough to find the flaw in Wilkins' proposal today: any lodestone strong enough to pull the ball up the ramp would be too strong to let it fall back to its starting point.

A 19th-century device solved a similar problem by incorporating an electromagnet that was alternately turned on and off. When the circuit to the magnet was closed, the magnet's attraction was supposed to pull a connecting rod that acted through a crank to impart rotary motion to a disk. The spinning of the disk between two brushes was then expected to generate enough electricity to energize the magnet. Once the machine was started by hand the inventor expected it to run forever, or at least until the contact points on the switches were out. As so often happens in the design of perpetual motion machines, the inventor had made no allowance for the energy lost to friction and, in this case, to electrical resistance as well.

It is scarcely surprising that the chimera of perpetual motion has attracted not only inventors and optimists but also swindlers. One of the many outright frauds in the history of perpetual motion machines was perhaps the most elegant overbalanced wheel ever built. It was the work of a skilled Connecticut mechanic, E. P. Willis. A large gear wheel, mounted at an angle to the horizontal and fitted with a complex system of weights, purportedly drove a smaller hollow [illegible] bevel. After the machine had attracted much attention in New Haven, where Willis charged admission for viewing it, he moved it to New York in 1856. There the same attorney who was to comment on the perpetual rediscovery of Fludd's water mill went to see it. The exhibitors, he noted, were careful



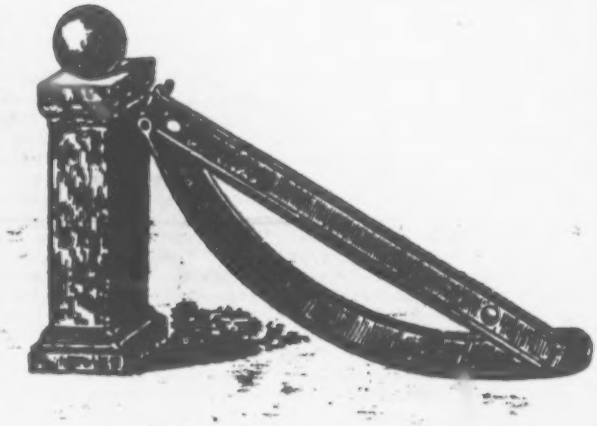
FRAUDULENT MACHINE that purported to demonstrate perpetual motion was built by a Connecticut mechanic in the 1850's. Ostensibly each pair of rod-linked weights that rested atop the tilted wheel (*right*) was shifted in position as the wheel turned, so that the uphill weight extended beyond the wheel's perimeter. The resulting imbalance was said to be sufficient to keep the wheel turning and to drive a flywheel (*left*). Actually compressed air passed through a circuit (*A, for left*), turning both of the wheels.

not to claim that Willis had achieved perpetual motion; rather, they challenged any visitor to provide another explanation for the machine's motion. Although a glass case kept viewers from inspecting the machine closely, the attorney noted that there was a suspiciously nonfunctional strut below the edge of the hollow flywheel. Evidently a steady flow of compressed air, undetectable outside the glass case, kept the flywheel turning. Thus it was actually the flywheel that drove the overbalanced wheel, rather than the reverse.

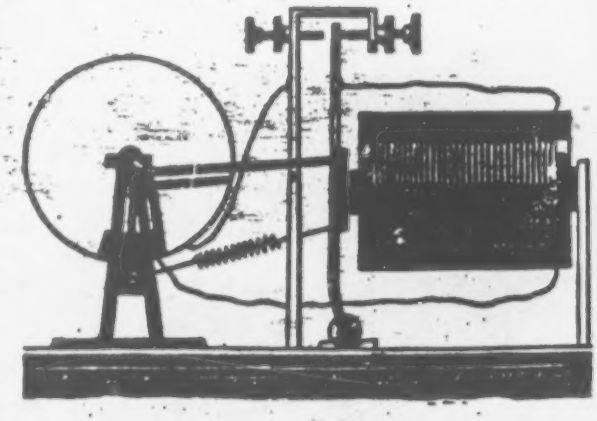
The Willis fraud, Orffyreus's water mill and all similar devices are based on the assumption that the first law of thermodynamics can be violated. Some perpetual motion machines, however, do not violate the first law; neither friction nor electrical resistance is a significant problem in their design. They are nonetheless impossibilities because they attempt instead to circumvent the second law of thermodynamics.

The foundation of the second law was laid down by the observations of Carnot, and the law was first fully formulated by the German physicist Rudolf Clausius. The first law, as we have seen, demonstrates that a fixed amount of mechanical work can always be converted into the equivalent amount of heat. But the most casual observation of a heat engine in operation—for example a steam engine—makes it plain that the reverse of the first law's axiom is not precisely true: a fixed amount of heat cannot be completely converted into the same amount of work. When heat is transformed into work, some of the initial energy is unavoidably wasted. In the case of a real steam engine operating in the real world, some of the wasted energy goes to overcoming friction, some is lost through warming the engine and the surrounding atmosphere, some through leakage and some through other avenues of dissipation.

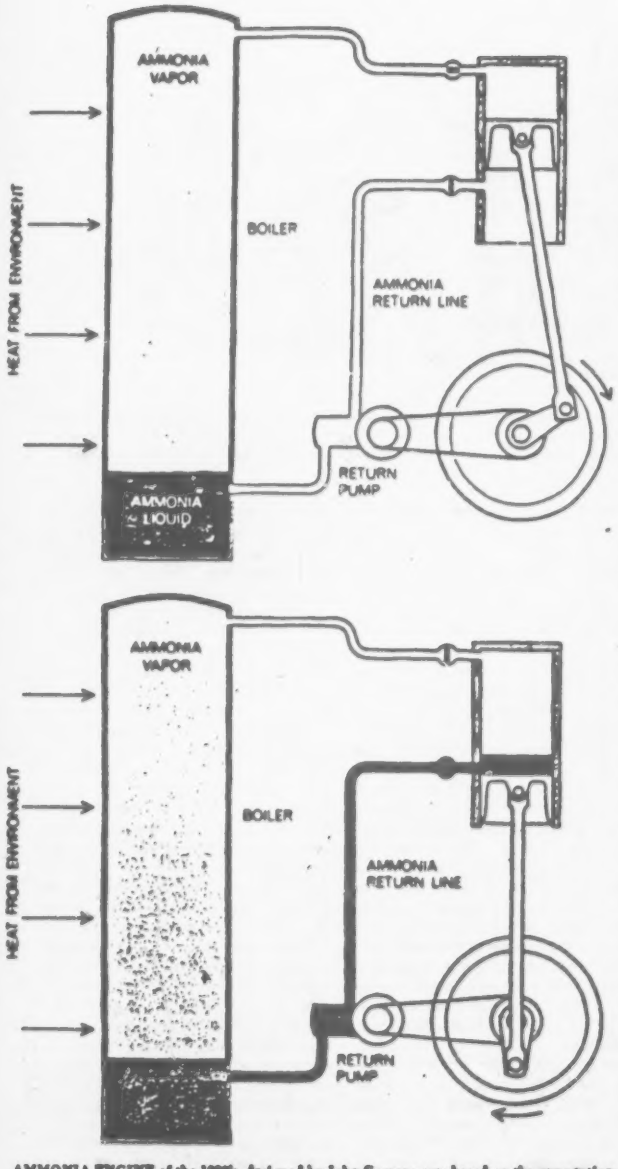
Carnot wanted to find out whether improved design could eliminate all steam engine losses. He created in his imagination an ideal engine; it was leakproof, completely insulated and frictionless. He then ran the imaginary engine through a full operating "cycle" (a concept, by the way, that Carnot was the first to develop). In one ideal cycle water is heated until it vaporizes into steam, and the pressure of the steam forces the engine's piston to move; the cycle is completed when the expanded steam cools and condenses into water again, allowing the piston to return to



PERPETUAL MOTION powered by "Magnetical Virtues" was to be achieved by a steel bullet as it rolled up and down a pair of ramps according to a design proposed by the Bishop of Chester in the 1670's. The lodestone placed on the top of the pedestal was expected to draw the bullet up the straight ramp, whereupon it would fall through a hole and roll back to its starting position. The bishop did not propose harnessing the device to obtain power.



PERPETUAL MOTION powered by electricity was often favored by 19th-century inventors. In this design the attraction of an electromagnet worked through a crank to turn a wheel; the wheel's rotation was then supposed to generate enough electricity to work the magnet. As usual the inventor neglected to allow for the losses from friction and resistance.



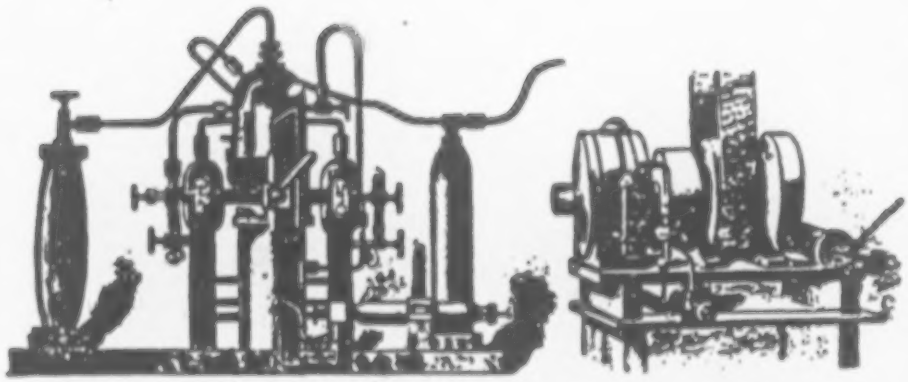
AMMONIA ENGINE of the 1800's, designed by John Gamgee, was based on the supposition that free power would be produced because heat transferred from the surroundings would turn the ammonia from liquid to gas. The gas pressure is enough to drive a piston (*top*). When the gas then expanded in the cylinder (*bottom*), the inventor expected that it would condense spontaneously and return to the boiler as a liquid to repeat the cycle. He did not anticipate the need to refrigerate the return side of his engine in order to convert the ammonia gas to liquid. The energy needed to do this, of course, is more than the engine produces.

its starting position. Thinking through the steps in this ideal cycle, Carnot realized that a complete conversion of heat into work was impossible; an unavoidable loss of thermal energy occurred in the process of cooling and condensation.

The language Carnot used to state his conclusions is strange to our ears because, like others in his day, he talked about heat in terms of caloric. What he had to say was nonetheless the earliest statement of the second law. The transformation of heat into motive power, Carnot wrote, "is fixed solely by the temperature of the bodies between which is effected... the transfer of the caloric." This is to say that, in order to do work, heat must "run downhill" as water does and, just as with water, the farther it runs downhill, the greater the amount of work it does. This is the concept we express today by saying that heat must be transferred from a higher temperature to a lower one to do work.

Building on Carnot, Clausius applied the word "entropy" (from the Greek for "turning") to the index used to measure the amount of heat that is unavoidably lost. The modern formulation of the second law that says that entropy always increases arises from the earlier realization that heat is a downhill flow. Because the supply of energy in the universe is a constant that cannot be increased or decreased, and because at the same time the downhill flow of heat is accompanied by inevitable losses, a time will inevitably come when the entire universe will be at the same temperature. With no more hills of heat and therefore, in Carnot's terms, no further transfers of caloric, there can be no work. This inevitable end, sometimes called the "heat death" of the universe, concerns us here because perpetual motion machines that attempt to violate the second law are expected to achieve a localized halt in the inevitable increase of entropy and produce a decrease of entropy instead.

The fact that, on the average, entropy continually increases does not, of course, rule out the possibility that occasional local decreases of entropy can take place. It is only that the odds against such an event are extraordinarily long. The bed of a river could suddenly cool, yielding its energy to the running water, and this energy could be applied in some way to make the water run uphill. But riverbeds do not cool and water does not run uphill. A similar loss of thermal energy from the river's environment could al-



"GENERATOR" AND "MOTOR" of a supposed perpetual motion device were exhibited in Philadelphia for more than a decade late in the 19th century. The inventor, John E. W. Keely, contended that the generator (*left*) turned tap water Into high-pressure "etheric vapor" when "vibratory energy" was applied. After Keely's death the totally fraudulent device was found to run on compressed air.

how the water to dissociate spontaneously into hydrogen and oxygen. But the water does not dissociate spontaneously. Furthermore, an old man on the riverbank, watching the water flow by, could grow younger rather than older, but he doesn't. Rivers continue to flow downhill, H_2O remains water and men inevitably ages. The chemist Henry A. Bent has calculated the odds against a local reversal of entropy, specifically the probability that one calorie of thermal energy could be converted completely into work. His result can be expressed in terms of a familiar statistical example: the probability that a group of monkeys hitting typewriter keys at random could produce the works of Shakespeare. According to Bent's calculation, the likelihood of such a caloric conversion is about the same as the probability that the monkeys would produce Shakespeare's works 15 quadrillion times in succession without error.

It is against these odds that the would-be inventor of a perpetual motion heat engine must struggle. One such inventor was John Ericsson, who was active in Washington, D.C., during the 1860's. He developed a heat engine that he called the air-motor because its normal operating temperature was zero degrees centigrade. The air-motor was not unlike an ordinary steam engine except that the working fluid was ammonia rather than water. Liquid ammonia vaporizes into a gas at a low temperature, and at zero degrees C. the gas exerts a pressure of four atmospheres. Ericsson reasoned that the transfer of heat from the environment, rather than the energy supplied by the combustion of fuel, would be enough to transform the ammonia working fluid from a liquid to a gas. He reasoned further that the ammonia gas, on driving the piston back and expanding, would cool, condense and drain into a reservoir, whereupon the cycle could begin again [*see illustration on opposite page*].

Anyone with the slightest knowledge of Carnot's cycle, let alone the second law of thermodynamics, could scarcely take such an idea seriously, yet Ericsson and his supporters were undoubtedly sincere. They had either incorrectly calculated or failed to calculate the air-motor's temperature requirements. The heat transfer from the environment was indeed sufficient to convert ammonia from a liquid to a gas, but this advantage is nullified in the system as a whole by the cooling of the gas on expansion. Starting at zero degrees C. and a pressure of four atmospheres, the temperature of the gas has fallen to −33 degrees by the time its volume has quadrupled. If the gas is to condense into a liquid, both the condenser and the reservoir must be at a temperature lower than −33 degrees. Ericsson had not provided for this cooling, and if he had, the cooling process would of course have required more energy than the air-motor could produce.

One of Ericsson's principal supporters was B. F. Isherwood, Chief Engineer of the U.S. Navy. In March, 1881, Isherwood reported favorably on the air-motor to the Secretary of the Navy, in spite of the fact that scholars had pointed out that the engine fatally violated the second law. Official Washington came close to embracing the inventor. The Secretary of the Navy was not the only high official who inspected a model of the air-motor with interest; so did other Cabinet members and President Garfield himself. Isherwood's gullibility may be hard to understand, but not his interest. This was an era when in order to keep the U.S. fleet at sea it was necessary to maintain a complicated and expensive network of coaling stations abroad. If the Ericsson engine had worked, coaling stations could have been forgotten and all the energy the Navy would have needed to power its fleet could have been provided by the thermal energy contained in the seawater in which the ships floated.

The surprisingly wide acceptance of proposals such as Ericsson's can be explained, of course, by general ignorance of known principles. As early as 1775 the French Academy of Sciences passed a resolution refusing to entertain any future communications concerning perpetual motion. The U.S. Patent Office has long declined to examine applications for patents covering perpetual motion machines unless the applicant furnishes a working model or "other demonstration ... of the operativeness of the invention," a ruling that has produced much hostile correspondence but no working models. In spite of such official opposition public sophistication regarding the possibility of building perpetual

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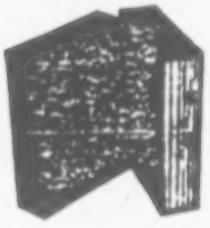

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motion machines was slow to develop.

Perhaps the most ingenious, and certainly the longest-lived, swindle involving a supposed perpetual motion machine began in 1873, when John E. W. Keely unveiled a combined "generator" and engine at his home in Philadelphia. There was nothing unusual about Keely's engine, which was a variation on the conventional steam engine. Keely's generator, however, was extraordinary. It was an elaborate combination of metal globes, tubes, petcocks, nozzles, valves and gauges, but its operation was deceptively simple. Keely would blow into a nozzle for half a minute and then pour five gallons of tap water into the generator through the same nozzle. After turning various petcocks and valves he would show onlookers a pressure gauge indicating that the generator was full of a mysterious "vapor" with a pressure of 10,000 pounds per square inch. "People have no idea of the power in water," Keely would say. "A bucket of water has enough of it to vapor to produce a power sufficient to move the world out of its course."

Keely and his associates formed the Keely Motor Company, capitalized at $1 million. They raised much of the money from gullible New York businessmen. As the years passed, although no engines other than the first one were ever built, Keely's showmanship became more polished. By 1881 he had begun to attribute the production of vapor to "vibratory energy," and he would "vivify" the vapor during demonstrations with a giant tuning fork. By 1884 he had mastered what he now called the "etheric vapor" or the "interatomic ether" that he demonstrated a new device: a cannon, complete with a "vibrator" near the breech, that was capable of propelling a ball 200 yards with a muzzle velocity of 300 feet per second.

Keely died in 1898. The son of one of his major backers promptly rented his Philadelphia house and explored the premises in the company of reputable witnesses, seeking evidence of fraud. Under the floor of the house the searchers found a three-ton metal tank that had evidently served as a reservoir for compressed air. In the walls were found quantities of brass tubing, and a false ceiling suggested the means by which Keely and his associates had conducted the compressed air to his generator. Whatever other laws he may have broken in his long career, Keely had left the first and second laws of thermodynamics inviolate.

TESTIMONY OF HON. TRENT LOTT

MR. CHAIRMAN AND DISTINGUISHED MEMBERS OF THE SUBCOMMITTEE, I WANT TO THANK YOU FOR HOLDING THIS HEARING TO LEARN OF FIRST HAND ACCOUNTS FROM THOSE OF US WHO HAVE MADE EFFORTS TO HELP JOSEPH NEWMAN, A CONSTITUENT OF MINE, WHO HAS BEEN TRYING FOR SEVEN YEARS TO WIN A PATENT FOR A DEVICE WHICH CONVERTS TINY PARTICLES OF MATTER INTO ENERGY.

JOSEPH NEWMAN'S MACHINE OPERATES ON THE ACCEPTED SCIENTIFIC PRINCIPLE THAT ALL MATTER IS CONCENTRATED ENERGY, WHICH CAN BE RELEASED IF ONE HAS A MECHANISM FOR UNLOCKING IT. MR. NEWMAN CLAIMS THAT HIS DEVICE CONVERTS POTENTIAL ENERGY TO ACTUAL ENERGY AT AN INCREDIBLY EFFICIENT RATE, SO THAT THE MACHINE PRODUCES UP TO 25 TIMES AS MUCH ENERGY AS IT TAKES IN FROM THE BATTERY PACK THAT RUNS IT. IF THIS INVENTION WORKS, THE IMPACT COULD BE INCREDIBLE.

THE CHRONOLOGY OF MR. NEWMAN'S EFFORTS TO OBTAIN A PATENT IS LENGTHY. MR. NEWMAN HAS NOT LEFT A STONE UNTURNED. THE EVENTS OF THE PAST SEVEN YEARS AND THE RESULTS OF WHAT THE EXECUTIVE AND JUDICIAL BRANCHES HAVE OR HAVE NOT DONE, HAS FORCED THE LEGISLATIVE BRANCH TO ADDRESS THIS CASE BY THE INTRODUCTION OF PRIVATE LEGISLATION WHICH WOULD ACCOMPLISH WHAT MR. NEWMAN HAS OTHERWISE BEEN UNABLE TO OBTAIN - A FAIR HEARING FROM HIS GOVERNMENT AND A FAIR SHOT AT THE MARKETPLACE.

CONSEQUENTLY, ON DECEMBER 17, 1985, I INTRODUCED H. R. 3977, A BILL WHICH AUTHORIZES AND DIRECTS THE SECRETARY OF COMMERCE, ACTING THROUGH THE COMMISSIONER OF PATENTS AND TRADEMARKS, TO IMMEDIATELY ISSUE A PIONEER PATENT TO MR. NEWMAN FOR THE INVENTION DESCRIBED ON THE PATENT APPLICATION NUMBERED 179,474 AND FILED IN AUGUST OF 1980. AS I PREVIOUSLY MENTIONED, MR. NEWMAN HAS TENACIOUSLY AND CONSISTENTLY WORKED FOR SEVEN YEARS TO RECEIVE A PATENT ON HIS ENERGY MACHINE. I HAVE ASSISTED MR. NEWMAN THROUGH THESE EVENTS AND AFTER SEEING LITTLE RESULTS, I CHOSE TO INTRODUCE PRIVATE LEGISLATION ON HIS BEHALF.

MR. CHAIRMAN, I DO NOT FEEL THAT THE PATENT OFFICE HAS DONE ENOUGH TO PROCESS MR. NEWMAN'S PATENT APPLICATION. THEREFORE, I FEEL THAT THE LEGISLATIVE PROCESS IS NOW THE BEST ALTERNATIVE. I URGE THE MEMBERS OF THIS SUBCOMMITTEE TO CAREFULLY REVIEW THE PATENT PROCESS, ESPECIALLY IN MR. NEWMAN'S CASE, AS I BELIEVE IT IS FLAWED AND NEEDS TO BE ADDRESSED.

IN SUMMARY, IN LIGHT OF CONGRESS' OVERSIGHT RESPONSIBILITIES AND THE FACT THAT IT IS EMPOWERED BY THE CONSTITUTION TO ISSUE PATENTS, AND THE FACT THAT THIS INVENTION IS POTENTIALLY BENEFICIAL TO HUNDREDS OF MILLIONS OF PEOPLE; I FEEL IT IS TOTALLY IN ORDER FOR CONGRESS TO GRANT MR. NEWMAN A PATENT.

TESTIMONY BEFORE THE SENATE SUBCOMMITTEE ON

ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESS

BY REP. WAYNE DOWDY

MR. CHAIRMAN: I am happy to lend my voice in support of Joseph Newman today, not so much because I am convinced of the merits of his invention--though I am--but rather because no one should have to endure the treatment Mr. Newman has undergone at the hands of the United States Patent and Trademark Office (PTO).

Mr. Newman came to me last year and talked with me of his invention. I am not a physicist, but I was intrigued by the idea of his energy machine and its apparent potential. I have since read considerable testimony from experts which suggests that Mr. Newman has indeed devised a revolutionary new form of energy production. I have found their testimony compelling, compelling enough to allow Mr. Newman the chance to test the value of his invention in the market place where in the end it will either be validated or consigned to the dustbin of other failed entrepreneurial endeavors.

Instead, Mr. Newman has been forced to finance a long and frustrating struggle against the PTO. Without a patent his work will go unprotected and, consequently, unmarketed.

I have never understood the PTO's adamant stand in this matter. The PTO has been authorized by Congress to "promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." [Article I, Section 8 of the U.S. Constitution] To gain a patent, a person must prove that his invention is novel, non-obvious to a person skilled in the art to which the invention pertains, and useful. I believe Mr. Newman has satisfied all three of these criteria. Yet, instead of promoting Mr. Newman's invention, the PTO has spent thousands of taxpayer dollars to thwart him. The rational behind this behavior is unclear to me.

As I understand it, the PTO is more concerned that the machine cannot work, not that it does not work. It has labeled the invention as "perpetual motion", a buzz word for crack pot schemes. Mr. Newman has reiterated that his invention is not accurately described as a perpetual motion machine, but rather as a very efficient energy device. Mr. Newman has submitted an impressive list of experts who substantiate his claims. On the other hand, tests conducted by the PTO have cast more doubt on its methods than on the effectiveness of Mr. Newman's machine.

It is not, however, in my capacity to argue the scientific merits of Mr. Newman's case. In fact, the scientific aspects of the case have now become secondary to me. What has become more important is that Mr. Newman has been unfairly treated by an obstinate Patent Office which has nothing to lose by granting him a patent--except perhaps a point. I do not believe, however, that that point is worth wrecking a man's career and life's work. Furthermore, if the PTO denies this country the benefits of what could be a revolutionary energy device, then its obstinancy would, in my mind, be criminal.

In my opinion the PTO has failed and it is up to Congress to take corrective action. I have introduced a private bill in the House on Mr. Newman's behalf asking that he be granted a pioneering patent for his energy machine. Several of my colleagues have introduced their own private relief bills for Mr. Newman. His support in the House is bipartisan, it is not exclusive to one geographical area, nor a particular ideological persuasion. Beyond Congress, Mr. Newman's adherents have grown in number. I have received dozens of letters in support of Mr. Newman's efforts from around the country. National columnists have taken up his cause and the media have reported favorably on his work. The U.S. government in the form of the Patent Office has become the villain--another example, some of the letters have stated, of government excess. We should change this perception and change it soon. I hope the Senate will support Mr. Newman and move to grant him a pioneering patent.

Again, I thank the committee for the opportunity to present this testimony and I commend the chairman for calling these important hearings.

STATEMENT OF SENATOR JOHN C. STENNIS
BEFORE SENATE GOVERNMENTAL AFFAIRS SUBCOMMITTEE ON ENERGY,
NUCLEAR PROLIFERATION AND GOVERNMENT PROCESSES
JUNE 30, 1986

MR. CHAIRMAN, I COMMEND YOU FOR HOLDING THIS HEARING AND ALLOWING JOE NEWMAN AN OPPORTUNITY TO MAKE HIS CASE BEFORE THE UNITED STATES SENATE. THIS IS AN IMPORTANT MATTER AND WELL DESERVES THE ATTENTION OF YOUR COMMITTEE.

FOR A NUMBER OF YEARS MR. NEWMAN HAS MADE PERSISTENT AND VALIANT EFFORTS TO OBTAIN A PATENT FOR HIS ENERGY MACHINE. I HAVE TRIED TO HELP HIM IN THOSE EFFORTS AND, QUITE FRANKLY, HAVE BEEN DISTURBED BY SOME OF THE OBSTACLES THAT HE HAS ENCOUNTERED. I HOPE THIS HEARING WILL EXAMINE THOSE PROBLEMS AND GIVE MR. NEWMAN AN OPPORTUNITY TO PRESENT HIS FACTS.

FOR THE PAST TWENTY YEARS THIS SELF-TAUGHT BACKYARD INVENTOR FROM LUCEDALE, MISSISSIPPI, HAS CONCENTRATED HIS ABILITIES ON THE DEVELOPMENT OF A MACHINE WHICH WOULD PRODUCE MORE ENERGY THAN IT CONSUMES. SINCE I AM NOT A SCIENTIFIC EXPERT, I CANNOT STATE WITH CERTAINTY THAT HIS DEVICE ACHIEVES THIS. HOWEVER, MR. NEWMAN CERTAINLY HAS MADE A STRONG CASE FOR THE ACCOMPLISHMENTS OF HIS INVENTION, AND I DO BELIEVE THAT MR. NEWMAN'S INVENTION DESERVES A FULL AND FAIR EXAMINATION BY SCIENTISTS. I FEAR THAT AT SEVERAL STAGES HE HAS FAILED TO GET THAT KIND OF OBJECTIVE EVALUATION.

MR. CHAIRMAN, I BELIEVE OUR COUNTRY NEEDS MORE PEOPLE LIKE JOE NEWMAN--PEOPLE WHO ARE WILLING TO TACKLE CHALLENGES THAT CONVENTIONAL WISDOM SAYS ARE IMPOSSIBLE TO ACHIEVE, PEOPLE WHOSE IMAGINATION SOARS ABOVE THE CONVENTIONAL SCHOOLS OF SCIENTIFIC THOUGHT AND SEES THE BOUNDLESS OPPORTUNITIES FOR HUMAN ADVANCEMENT. MUCH OF THE ECONOMIC PROGRESS OF OUR NATION HAS COME FROM INDIVIDUALS WITH A VISION SUCH AS THIS.

I AM AFRAID, THOUGH, THAT MR. NEWMAN'S EXPERIENCE IS LIKELY TO DISCOURAGE OTHERS FROM SEEKING SUCH AMBITIOUS, AND UNCONVENTIONAL, GOALS. MR. NEWMAN HAS MADE REPEATED EFFORTS TO GET HIS MACHINE PATENTED AND HAS ENCOUNTERED SUBSTANTIAL OBSTACLES AT EVERY TURN. A PERSON OF LESSER COMMITMENT AND DEDICATION WOULD HAVE SIMPLY GIVEN UP LONG AGO.

PERHAPS I SHOULD POINT OUT THAT THE CONSTITUTION ITSELF ARTICULATES THE BASIS FOR OUR PATENT LAW, THAT IS, "TO PROMOTE THE PROGRESS OF SCIENCE AND USEFUL ARTS." IF EVERY INVENTOR RAN INTO AS MANY PROBLEMS IN TRYING TO GET A PATENT AS JOE NEWMAN HAS, I DOUBT THAT WE WOULD HAVE MADE MUCH SCIENTIFIC PROGRESS IN THE LAST TWO CENTURIES, AND WE CERTAINLY WOULD NOT ENJOY MANY OF THE PRODUCTS THAT WE TAKE FOR GRANTED TODAY.

SO, MR. CHAIRMAN, JOE NEWMAN HAS EARNED THE CHANCE TO GET A FAIR DECISION ON THE MERITS OF HIS INVENTION. I HOPE THIS COMMITTEE WILL CONTINUE TO PURSUE THIS MATTER UNTIL YOU ARE SATISFIED THAT HE HAS BEEN AFFORDED EVERY REASONABLE OPPORTUNITY TO HAVE HIS MACHINE TESTED BY SCIENTISTS WHO CAN FAIRLY AND OBJECTIVELY EVALUATE IT.

TESTIMONY OF THE HONORABLE ROBERT L. LIVINGSTON

BEFORE THE SUBCOMMITTEE ON ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES

JULY 30, 1986

MR. CHAIRMAN, MEMBERS OF THE SUBCOMMITTEE, THANK YOU FOR GIVING ME THE OPPORTUNITY TO TESTIFY ABOUT THE LEGISLATION I HAVE INTRODUCED IN THE HOUSE OF REPRESENTATIVES GRANTING JOSEPH NEWMAN A PATENT FOR HIS ENERGY-GENERATING MACHINE.

I HAVE INTRODUCED THIS BILL BECAUSE I AM CONVINCED, AFTER THOROUGHLY STUDYING THE EVENTS OF THIS CASE, THAT THE U.S. PATENT OFFICE HAS NOT FOLLOWED NORMAL OR PROPER PROCEDURE IN THE HANDLING OF MR. NEWMAN'S APPLICATION. INDEED, THE ACTIONS OF THE PATENT OFFICE, THE NATIONAL BUREAU OF STANDARDS (NBS), AND THE FEDERAL JUDGE IN THIS CASE HAVE BEEN ILLOGICAL AND CONSTITUTE WHAT APPEARS TO BE A DETERMINED EFFORT TO DENY MR. NEWMAN A PATENT NO MATTER WHAT. THIS INVENTOR HAS BEEN FORCED TO ENDURE EXTRAORDINARY OPPOSITION FROM HIS GOVERNMENT, OPPOSITION WHICH CANNOT--FROM A LEGAL STANDPOINT--BE JUSTIFIED.

FOR OVER SEVEN YEARS, PATENT OFFICE OFFICIALS HAVE DENIED NEWMAN A PATENT ON THE GROUNDS THAT HIS INVENTION DOES NOT WORK, YET UNTIL JUNE 26 OF THIS YEAR, THEY HAD NOT A SINGLE SHRED OF EVIDENCE TO SUBSTANTIATE THEIR CLAIM. IN FACT, BOTH THE PATENT EXAMINER AND THE BOARD OF APPEALS REJECTED NEWMAN'S APPLICATION WITHOUT EVER RUNNING A TEST OF THE MACHINE. THEIR ASSERTION THAT NEWMAN'S CLAIMS WERE IMPOSSIBLE AND THAT NOTHING THEY HAD SEEN INDICATED OTHERWISE BLATANTLY IGNORED THE AFFIDAVITS OF INDEPENDENT SCIENTISTS WHO HAVE TESTED THE DEVICE AND SWEAR THAT IT WORKS.

WHAT IS MORE ALARMING IS THE FACT THAT TO THIS DAY, THE PATENT OFFICE HAS CHOSEN TO IGNORE THE FINDINGS OF A COURT-

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APPOINTED SPECIAL MASTER WHO WAS DEEMEI TECHNICALLY-COMPETENT TO INVESTIGATE NEWMAN'S CLAIMS. I WOULD LIKE TO QUOTE FOR YOU TWO EXCERPTS FROM THE SPECIAL MASTER'S SEPTEMBER 1984 REPORT:

> "EVIDENCE BEFORE THE PATENT AND TRADEMARK OFFICE AND THIS COURT IS OVERWHELMING THAT NEWMAN HAS BUILT AND TESTED A PROTOTYPE OF HIS INVENTION IN WHICH THE OUTPUT ENERGY EXCEEDS THE EXTERNAL INPUT ENERGY."

> "EVEN THOUGH THE OPERATION OF PLAINTIFF'S SYSTEM SEEMS CONTRARY TO RECOGNIZED SCIENTIFIC PRINCIPLES, PLAINTIFF HAS DEMONSTRATED THE OPERATION OF HIS SYSTEM BY VERY CLEAR EVIDENCE AND IS THEREFORE ENTITLED TO A PATENT IF HE OTHERWISE SATISFIES THE REQUIREMENTS OF THE PATENT STATUTE."

THE FEDERAL JUDGE IN THIS CASE APPOINTED THE SPECIAL MASTER BECAUSE HE DID NOT FEEL PERSONALLY QUALIFIED TO RENDER A TECHNICAL EVALUATION OF THE MACHINE. HOWEVER, WHEN THE REPORT WAS ISSUED, HE REJECTED THE FINDINGS OUT OF HAND. FEDERAL LAW CLEARLY STATES THAT IN A NON-JURY ACTION, A COURT MUST ACCEPT A SPECIAL MASTER'S FINDINGS AS FACT UNLESS THEY ARE "CLEARLY ERRONEOUS." AS FAR AS I AM AWARE, THE JUDGE HAS NEVER CITED WHY THE REPORT IS CLEARLY ERRONEOUS.

EQUALLY DISTURBING IS THE FACT THAT WHEN THE JUDGE ORDERED THE NATIONAL BUREAU OF STANDARDS TO TEST NEWMAN'S DEVICE, HE ESTABLISHED OUTRAGEOUS TESTING CONDITIONS: NEWMAN WAS PROHIBITED FROM ATTENDING ANY TESTS, THE TESTS WERE TO BE DONE AT THE DISCRETION OF THE NBS, AND THE NBS WAS AUTHORIZED TO DESTROY THE MACHINE.

ALTHOUGH A FEDERAL APPEALS COURT CALLED THESE CONDITIONS FUNDAMENTALLY UNFAIR AND ESTABLISHED NEW TESTING CONDITIONS, THE NBS FAILED TO TEST THE MACHINE WITHIN THE 30 DAYS ALLOTTED TO IT.

PERHAPS MOST OUTRAGEOUS OF ALL IS THE FACT THAT THIS SAME JUDGE THEN GAVE THE NBS MORE TIME BY IMPOUNDING THE MACHINE WITHOUT A HEARING AND CITING NO FACTUAL OR LEGAL AUTHORITY TO DO SO.

NBS OFFICIALS RECENTLY ISSUED A REPORT STATING THAT NEWMAN'S CLAIMS ARE INVALID BASED ON TESTS THEY HAVE RUN THIS YEAR. HOWEVER, I UNDERSTAND THERE IS NOW SOME DEBATE OVER WHETHER OR NOT THE MACHINE WAS IMPROPERLY GROUNDED DURING TESTING. IT CERTAINLY WOULD BE NICE TO GET TO THE BOTTOM OF THIS, SINCE THIS IS THE ONLY EVIDENCE THE PATENT OFFICE HAS TO HANG ITS HAT ON. WITH REGARD TO THE OBJECTIVITY OF THE TESTS, IT IS INTERESTING TO NOTE THAT AT LEAST ONE NBS OFFICIAL CRITICIZED NEWMAN'S INVENTION BEFORE ANY TESTS WERE RUN.

THIS IS THE FIRST TIME IN PATENT HISTORY THAT THE NBS HAS TESTED AN INVENTION FOR THE PATENT OFFICE AND CONGRESS HAS NOT APPROPRIATED FUNDS FOR THIS PURPOSE. AS A MEMBER OF THE HOUSE APPROPRIATIONS COMMITTEE, I AM VERY CURIOUS TO KNOW FROM WHAT ACCOUNT THE ESTIMATED $82,000 IN TESTING EXPENSES CAME.

WHY HAS THE PATENT OFFICE, WHICH HAS BEEN ENTRUSTED BY CONGRESS WITH THE IMPORTANT TASK OF PROMOTING SCIENTIFIC PROGRESS, GONE TO SUCH GREAT LENGTHS TO DENY THIS MAN THE LEGAL RIGHT TO HIS INVENTION? WHY HAS THE FEDERAL JUDGE'S TREATMENT OF NEWMAN BEEN SO ARBITRARY AND HIGH-HANDED? WHY DID IT TAKE OVER FOUR MONTHS AND $82,000 TO TEST AN INVENTION WHICH SUPPOSEDLY DOESN'T WORK, AND WHERE DID THAT MONEY COME FROM?

MR. CHAIRMAN, THE PATENT OFFICE'S INFLEXIBLE POSITION IN THIS MATTER IS REMINISCENT OF A PATENT OFFICE DIRECTOR'S STATEMENT IN 1899 THAT "EVERYTHING THAT CAN BE INVENTED HAS BEEN INVENTED." CLEARLY, MR. NEWMAN IS BEING DENIED HIS CONSTITUTIONAL RIGHT TO DUE PROCESS OF LAW.

I STRONGLY FEEL THAT CONGRESS SHOULD ACT BECAUSE THE EXECUTIVE AND JUDICIAL BRANCHES HAVE FAILED THIS AMERICAN

CITIZEN. IN LIGHT OF CONGRESS' OVERSIGHT RESPONSIBILITIES AND THE FACT THAT IT IS EMPOWERED BY THE CONSTITUTION TO ISSUE PATENTS, THE FACT THAT THE PREPONDERENCE OF EVIDENCE IS IN NEWMAN'S FAVOR, AND THE FACT THAT THIS INVENTION IS POTENTIALLY BENEFICIAL TO HUNDREDS OF MILLIONS OF PEOPLE, IT IS TOTALLY IN ORDER FOR CONGRESS TO GRANT NEWMAN A PATENT AND TO ALLOW THE INVENTION TO BE TESTED WHERE IT SHOULD HAVE BEEN TESTED A LONG TIME AGO--IN THE AMERICAN MARKETPLACE.

U.S. DEPARTMENT OF COMMERCE
STATEMENT OF
JOHN W. LYONS, DIRECTOR
NATIONAL ENGINEERING LABORATORY
NATIONAL BUREAU OF STANDARDS

BEFORE THE
SUBCOMMITTEE ON ENERGY, NUCLEAR PROLIFERATION,
AND GOVERNMENT PROCESSES
U.S. SENATE

JULY 30, 1986

Good morning. I am here to discuss the program at the National Bureau of Standards (NBS) on energy-related inventions and, as a separate matter, our role in testing Joseph Newman's device.

Since 1975, NBS has participated in the Federal Energy-Related Inventions Program, a program established by Congress to encourage and support energy-related innovations by independant inventors and small businesses.

The program has two parts. At no cost to the inventor, the NBS Office of Energy-Related Inventions (OERI) provides evaluations of inventions and recommends those it considers promising to the Department of Energy (DOE). DOE may provide financial support to the inventor to help in commercializing the idea.

The program is open to all inventors who believe they have ideas which are technically feasible, will save significant amounts of energy or increase supplies of available energy from non-nuclear sources, and have a reasonable chance of becoming a commercial success. Inventors getting an OERI recommendation are a relatively select group. An invention which passes initial review undergoes a rigorous two-stage evaluation. In the process, we draw upon hundreds of expert consultants from government, industry, and universities.

We have received some 22,000 applications. About half survive preliminary screening. These are then put through the two-stage evaluation process. Nearly 2% pass through the entire process and are recommended to DOE for support. DOE has awarded grants totaling more than $16.6 million for 234 of the 358 inventions recommended by NBS. At last count, 46 inventors have been able to acquire a total of nearly $46 million in follow-on financing, mostly from private, non-federal sources.

Apart from the financial assistance offered through the energy-related inventions program, inventors whose ideas survive the evaluation process receive a measure of credibility. With evidence of a favorable OERI review, an inventor often can take an idea to banks or venture capitalists and obtain additional support.

OERI does not test individuals' inventions. This statement is made clearly in all of the OERI literature. Obviously, considering the large number of requests for evaluations OERI receives--over 22,000 since the program began--we could not afford to operate as a testing agency for inventors. We do, however, often make recommendations about the kinds of tests which might aid an inventor, and occasionally we suggest testing or research laboratories which might be willing to perform the tests.

I have additional information about the program which I submit, with your approval, for the record.

Now I would like to address NBS' involvement with Mr. Joseph Newman. Our first contact with Mr. Newman was in September 1975, when he submitted an evaluation request to OERI. Over the next several months, OERI advised Mr. Newman by letter several times that we needed additional information--specifically, test data and an explanation of why and how the invention works since his claims ran contrary to well-established scientific principles. OERI did not receive such information.

In early October 1982, OERI was advised by the Department of Energy that Mr. Newman had brought a prototype device to Washington, D.C. on his own initiative. OERI indicated that Mr. Newman was welcome to visit NBS to discuss his invention with an evaluator. Mr. Newman then arrived at NBS with his device and asked OERI to test his invention. Our staff affirmed the OERI policy of not performing laboratory tests on individual inventions. To assist Mr. Newman, OERI put him in contact with a member of the Auburn University staff in order to help him have the device tested at a place relatively close to Mr. Newman's residence.

At DOE's request, OERI agreed later that month (October 1982) to process Mr. Newman's evaluation request. After review, the invention was rejected in December 1982 since neither the required test data nor explanation of operation were provided by Mr. Newman. Over the next year and a half, OERI corresponded several times with Mr. Newman's attorney about his client's evaluation request. The OERI file on the Newman device shows no further actions.

Subsequently Mr. Newman and the U.S. Patent and Trademark Office (PTO) came before the U.S. District Court in Washington, D.C. as discussed by Mr. Tegtmeyer in his testimony today. As part of the legal proceedings, the Patent and Trademark Office (PTO), in late 1984, asked NBS to conduct laboratory measurements on Mr. Newman's device to test the inventor's claim that his device would produce more energy than it used. Because NBS has a clear mission to conduct research for other Federal agencies, in December 1984 we agreed to conduct such tests for PTO. The testing was to be performed by the NBS Center for Electronics and Electrical Engineering, which is well equipped to make electrical measurements. No staff of the NBS OERI was involved with these tests.

After a series of legal and technical issues regarding the conditions for testing were addressed in several court proceedings and orders, the device was delivered to NBS on January 24, 1986. Mr. Newman came to NBS on February 10, 1986, to make sure the device was ready for testing. With the Court's permission, we began preliminary measurements on March 11, 1986, and then prepared a complete testing plan.

After submitting that plan, we received permission from the Court to proceed with tests, which were conducted between late March and early June 1986. A report on the testing and findings was submitted on June 26, 1986, and made part of the public record by the Court.

Under all conditions tested, the input power from the batteries running Mr. Newman's device exceeded the output power from the device. That is, the device did not deliver more energy than it used. A copy of our report is attached to my written testimony. I would like to emphasize the following points about our tests.

The electrical characteristics of the device required NBS to combine a variety of instrumentation in order to conduct valid tests. Improper equipment would give inaccurate results.

We did not invent any special equipment or computer programs to conduct the tests. All of the measurement devices we used had previously been used by NBS.

NBS conducted the tests using the information supplied by Mr. Newman regarding his device's operation. We conducted the tests following a test plan which had been submitted to the PTO and by that agency to the Court and to Mr. Newman before the tests began. PTO invited Mr. Newman to witness the tests, but he did not attend any of them.

Our results are clear and unequivocal; they are explained in detail in our report.

Thank you, Mr. Chairman. I would be happy to answer any questions you may have.

JOHN W. LYONS

Date of Birth: November 5, 1930

Birthplace: Reading, Massachusetts

Education: Degrees
Harvard University, A.B., Chemistry - 1952
Washington University, A.M., Physical Chemistry - 1963
Washington University, Ph.D., Physical Chemistry - 1964

Positions:
Director
National Engineering Laboratory
National Bureau of Standards

As Director of the National Engineering Laboratory, Dr. Lyons is responsible for NBS's research in applied mathematics, building technology, electronics and electrical engineering, energy conservation, engineering standards development, fire, manufacturing engineering, and chemical engineering.

From April to December 1981 Dr. Lyons served as the Acting Deputy Director of the National Bureau of Standards.

Dr. Lyons was Director of the NBS Center for Fire Research until December 18, 1977, and was responsible for providing scientific and technical knowledge applicable to the prevention and control of fires.

Dr. Lyons served in various research and development positions at the Monsanto Company from 1955 to 1973. He specialized in the chemistry and uses of phosphorus-based chemicals including fire retardants. He served from 1971 to 1973 as a member of the ad hoc panel of fire research, a National Academy of Sciences evaluaton panel for the National Bureau of Standards.

Dr. Lyons is author of three books: Viscosity and Flow Measurements, The Chemistry and Uses of Fire Retardants, and Fire. He was co-author and editor of Fire Research on Cellular Plastics. He has contributed chapters to five other books and has written numerous papers and articles on technical or research topics. His early research interest was the physical chemistry of polyeletrolyte solutions, especially formation of complexes with metal ions. This work emphasized the behavior of inorganic polyphosphates and deoxy ribonucleic acid (DNA).

Dr. Lyons is a member of the National Academy of Engineering, a Fellow of the American Association for the Advancement of Science, a Fellow of the Washington Academy of Science, a member of the Naval Research Laboratory Naval Research Advisory Committee, a member of the Office of Science and Technology Policy Committee on Federal Laboratories, member of the American Chemical Society (past chairman of the St. Louis Section) and member of Sigma Xi. He serves on the Advisory Committee for Engineering, National Science Foundation; Advisory Council, College of Engineering, University of Maryland; Board of Directors, National Fire Protection Association and Board of Directors, American Society for Testing and Materials. He served on a special committee of the Maryland State Board for Higher Education to study the needs for engineering education (1983-84). He was chairman of the Products Research Committee (1974-79), a nine-member charitable trust administering a $5M research fund on fire research; co-chairman of the US-Japan Natural Resources Panel of Fire Research (1975-78). He received the Presidential Management Improvement Award in 1977 and the US Department of Commerce Gold Medal, also in 1977. In 1981 he received the Presidential Rank Award of Distinguished Executive.

TEST PLAN FOR MEASURING THE EFFICIENCY OF THE "NEWMAN MACHINE"

SECTION I. BRIEF DESCRIPTION OF TEST PLAN

INTRODUCTION

ASSUMPTION: The device which was delivered to NBS for test is an electric generator and not a combined electric generator and motor.

JUSTIFICATION: The specification delivered to NBS contained five drawings which purported to show (page 8) devices which were generators and devices which were generator-motor combinations. The device as submitted for testing did not conform to any of the drawings. To clarify the testing to be done, Mr. Flannery was asked to specify the output -- if the device were a generator only an electrical output would be measured, while both an electrical and a mechanical output would be measured for a combined motor and generator. In response, NBS was provided descriptions of tests in which only electrical quantities were measured.

Because of the information provided by Mr. Flannery, the following test plan treats the device as a generator. If, at some subsequent time, it becomes necessary to test the device as a generator-motor combination, all of the tests outlined in this plan would still be required. In that case, however, the electrical measurements would be supplemented by mechanical measurements.

SUMMARY OF TESTS

This summary outlines the tests which are to be performed. The specific tests are:

1. Electromagnetic interference effects will be reduced to permit the acquisition of accurate data.

2. The bandwidth of the signals of the device under test will be determined using digital waveform recorders with Fourier analysis and spectrum analyzers.

3. Input power will be measured using wide-band sampling instruments that sample and digitize the input voltage and current signals and perform the necessary multiplication and integration.

4. The output power will be measured by measuring the voltage applied to the load resistors. Computer-based sampling-type instruments and analog-type instruments will be used.

5. From the results in 3 and 4, the efficiency will be determined.

Additional information about the various tests is given in Section II.

March 20, 1986

SUMMARY OF TIME AND COST REQUIREMENTS

It is estimated that the tests outlined in this plan will require ninety days to complete. Additional details concerning the basis for this time estimate are given in Section III of this test plan. The estimated cost of completing the test plan, including funds already spent in its development, is $50,700.

GENERAL COMMENTS

The test plan, as presently conceived, requires no disturbance of the device under test other than the connection of test leads to it. Such connections were made during the preliminary tests with no apparent adverse effects.

It must be recognized that the results of the measurements may require the design of additional tests, the deletion of some of the measurements outlined above, or the development of an entirely different test strategy. If that be the case, MAS will prepare a modified test plan.

March 20, 1986

SECTION II. TESTS

1. Electromagnetic Interference Reduction

Measurements of the voltage across the coil have indicated that this particular measurement is very susceptible to the generation of spurious signals, presumably as a result of the time varying magnetic fields and the relatively large separation between the output terminals. The effects of the orientation and shielding of the leads connecting the measurement system to the device under test will be evaluated in an attempt to reduce this spurious signal to less than a few percent of the measured signal.

2. Determination of the Required Instrument Bandwidth

Time domain measurements of the battery voltage, the battery current, and the voltage across the coil suggest that although there are temporal variations of the waveforms on time scales of 10 - 100 ns, almost all of the power in the signal is concentrated in the lower frequencies. For this reason, the proposed measurement systems generally have bandwidths which are less than 100,000 Hz. Using waveform recorders to capture the signals and calculating the Fourier transforms of the digitized waveforms will provide quantitative information on the relative importance of the various frequency ranges. These data will be supplemented, as necessary, by analog spectral analysis. Both the digital and analog measurement systems will be evaluated to demonstrate that they are sufficiently accurate for the intended application.

3. Input Power Measurement

The input power will be measured in two different ways. One will be to use a wide-band wattmeter (as indicated in the attached figure) which was developed at NBS and the other will be to use a commercially available waveform recorder and a computer to multiply the voltage and current waveforms and to integrate the product over a preselected time interval. Both systems will be calibrated before and after the measurement. In this investigation, the input power P_{in} is

$$P_{in} = \left(\int_0^\tau V_b(t) I_b(t)\,dt\right)/\tau,$$

where $V_b(t)$ is the battery voltage which varies as the magnet rotates, $I_b(t)$ is the time dependent battery current, t is the time, and the integration is performed over a time interval which is τ seconds long.

4. Output Power Measurement

The output power will be measured in two different ways. In each of these measurements, resistor dividers will be connected to each output terminal of the coil, as shown in the attached figure. Four such dividers were constructed and calibrated to support the preliminary measurements. The final measurements may require the recalibration of these dividers and will require

the construction and calibration of additional dividers. These dividers will serve as the load for the power measurement and will permit accurate measurement of the voltage across the coil. The output power P_{out} is given by

$$P_{out} = (1/R\tau)\int_0^{\tau}[V_1(t)^2 + V_2(t)^2]dt$$

where $V_1(t)$ and $V_2(t)$ are the time dependent output voltages of the two dividers, R is the total resistance of either of the two identical dividers, t is the time and the preselected integration time interval is τ seconds. For the device under test, V_1 is zero when V_2 is nonzero and vice versa. In this case, the previous equation can be written in the following form:

$$P_{out} = (1/R\tau)\int_0^{\tau}[V_1(t) - V_2(t)]^2dt.$$

The first measurement approach will use a hardware adder and multiplier to determine $(V_1(t) - V_2(t))^2$. The result will then be used to calculate P_{out}. This portion of the measurement requires the design, construction and evaluation of the performance of custom hardware.

The second approach will be to digitize the waveforms $V_1(t)$ and $V_2(t)$ and perform all of the arithmetic computations using a computer.

5. Efficiency Determination

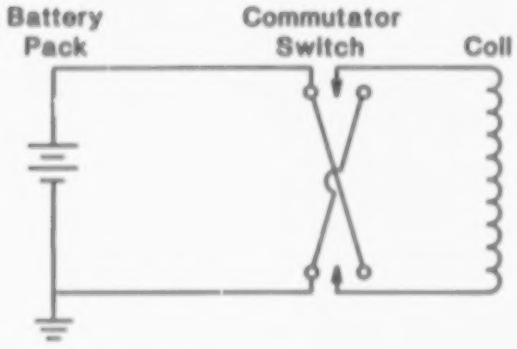
The efficiency of the device under test is given by

$$\text{efficiency} = P_{out}/P_{in},$$

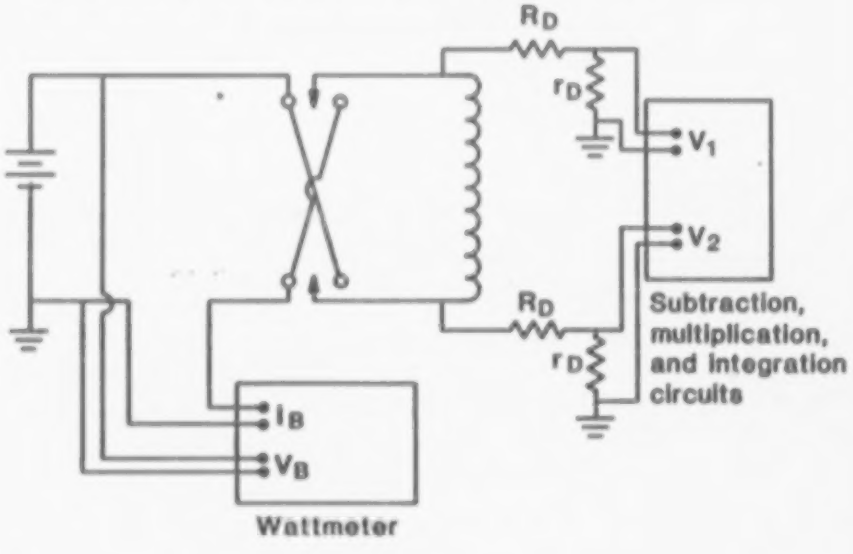
where P_{out} and P_{in} were defined above. When the individual measurements specified in items 4 and 5 have been completed and satisfactory agreement has been obtained using the various measurement techniques, then simultaneous measurements of the input and output power will be made and the efficiency will be calculated.

Items 3, 4, and 5 will be repeated for several values of the load resistance, e.g. 500,000 Ω, 100,000 Ω, and 50,000 Ω or less.

SCHEMATIC OF DEVICE UNDER TEST



SCHEMATIC OF DEVICE UNDER TEST SHOWING ELECTRICAL DIAGNOSTICS



SECTION III. ACTIVITY SUMMARY TO ESTIMATE THE MINIMUM TEST DURATION

Item	Time Required
Test EMI effects of lead position.	0.5 days
Construct and test shielding for leads.	1.5 days
Use two different analog spectrum analyzers to determine the frequency content of the four waveforms over the frequency range from several Hz to several MHz.	3.5 days
Develop appropriate Fourier transform software.	2.0 days
Use waveform recorder to determine the frequency content of the four waveforms over the frequency range from dc to several MHz.	3.0 days
Perform followup measurements to reconcile any apparent differences between the two measurement approaches.	2.0 days
Construct and calibrate probes.	2.0 days
Calibrate wide-band wattmeter.	3.0 days
Calibrate waveform recorder system.	3.0 days
Develop data acquisition and analysis software.	3.0 days
Measure input power using wide-band wattmeter.	1.0 day
Measure input power using waveform recorder. system.	1.0 day
Perform followup measurements to reconcile any apparent differences between the two measurement approaches.	2.0 days
Recalibrate instruments.	1.0 days
Construct and calibrate adder and multiplier.	8.0 days
Calibrate waveform recorder system.	3.0 days
Develop data analysis and acquisition software.	3.0 days
Measure output power using analog system.	1.0 day
Measure output power using digital system.	1.0 day
Perform followup measurements to reconcile any apparent differences between the two measurement approaches.	2.0 days
Recalibrate instruments.	1.0 day
Perform simultaneous input and output power measurements.	2.0 days
Draft a report documenting the measurement approach and results.	10.0 days
Review and modify the report.	5.0 days

STATEMENT OF JOSEPH NEWMAN
BEFORE THE SUBCOMMITTEE ON
ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES
DATED JULY 30, 1986

Good morning. Thank you for inviting me to appear today. My name is Joe Newman. I come here today from Lucedale, Mississippi. It may be in the backwoods. But that doesn't mean we are backward. No more than any other out of the way place, like, say Kitty Hawk. I am an inventor. That is how I make my living and, in the course of making my living, I have obtained patents for a number of devices and machines. None, however, have been as dramatic as the one I've been fighting to patent for the last seven years.

I have invented a machine which uses the properties of magnetism and electricity to generate power. The reason my machine is a technological breakthrough is that my machine creates more external output energy than the amount of internal input energy required to run it. My prototype is powered only by dry cell batteries. Various tests run by independent scientists have shown this machine can obtain efficiencies greater than 1000%. That means we have proven my machine can release more than ten times the energy than it takes to start it. The technology itself shows my device can produce much more than that. Think of the practical application of my machine to power your home, your car or any other use that requires energy.

The thing that surprised me is that instead of being greeted by the Executive Branch, the Patent Office, with curiousity and searching inquiries, I was greeted instead with incompetence, inconsistency, obstruction and worse. In the bargain some misleading impressions have been given some currency.

Firstly, my device does not -- as some say -- create energy. It releases available unused energy.

Secondly, I do not claim my machine is a perpetual motion machine as the Patent Office falsely and repeatedly says. Far from it. Through more than 21 years of hard work I have harnessed the properties of magnetism in a new way to obtain the unprecedented efficiency I've described. I do not claim my machine runs forever. I only claim it runs longer than any other motor or generator invented thus far.

Thirdly, I have proof for what I have to say. Thirty independent scientists including a principal physicist for Sperry Univac, Roger Hastings, with me here today, and Milton Everett of the State of Mississippi Geology Department, also present, have submitted sworn affidavits stating my machine works. My proofs persuaded no less than a former Commissioner of the Patent Office that my device works as I claim. This former Commissioner, Major Willian Schuyler, with an electrical engineering background, nominated by the Patent Office, not by me, was appointed by Federal Judge Thomas Jackson on his own motion, over my objection, to render an opinion for this Judge. Major Schuyler, who bears the title of Special Master, concluded that there was overwhelming evidence that my machine works. More than that, this former Commissioner stated there was no contradictory evidence and that the Patent Office had

knowingly not followed patent law and that the Patent Office's position that the machine was impossible was "clearly erroneous" and that they were overruled, and that the patent should issue if the applicant met the balance of the patent statute.

My counsel, John Flannery, has provided you with additional details. But let me add a few comments. I filed my first patent application on March 22, 1979 -- more than seven years ago. Since then the Patent Office has done nothing but throw up barriers to block me from obtaining a patent. At first I understood the Patent Office's reluctance to grant me a patent. However, I assembled the proof I've discussed that my machine works. I also complied with the Patent Office's other requirements. There is no question that my device is new. Or that it works. More than 30 credible scientists have listened to my technical process and ran their own tests and put their hard earned reputations on the line to state that my device works. The Special Master gave those courageous individuals their due by stating the evidence before the Court and the Patent Office was overwhelming that the invention worked as I claimed it did.

Since 1979, I have suffered eight different rejections by the Patent Office. Dealing with the Patent Office is like having a starring role in the movie CATCH 22. I have had a trial scheduled on three different dates: June 1984, February 1986, and now December 1986. I'm not sure I'll ever get a trial. And then my counsel tells me there is the appeal. Even when I get a Court of Appeals' order disciplining the lower Court, it is ignored by the lower Court, the N.B.S., and the Patent Office. The N.B.S. has just run these tests behind closed doors, and they did it wrong as Roger [Hastings] shall tell you in a moment and they expect me to pay for it -- $75,000. Imagine that. That's not fair. That's why I've turned to you as the representatives of the people, my Mississippi neighbors and others across this nation, who I believe want to give me a chance to succeed (or even to fail).

Please try to understand my frustration as an inventor who belives he has a new way to generate power.

Benjamin Franklin said:

> "There are everywhere a number of people who, being totally destitute of any inventive faculty themselves do not readily conceive that others may possess it."

Franklin and others saw the power granted to Congress as a protection for such individuals. That promise of protection has been withheld in recent years from me -- and others.

I have proven my machine works. I believe I am entitled to a pioneering patent as dictated by the guidelines of the Supreme Court. I appealed to the Patent Office to accept my proofs, to acknowledge my submission was "new" and to grant my pioneering patent so my pioneering invention could benefit others. Instead, they turned a deaf ear, disregarded their own procedures, knowingly and consistently violated patent and federal law, and the Courts have equally condoned this injustice. That is why I have turned to you on behalf of myself and all inventors and citizens who believe the purpose of the patent system is to promote, not stifle, inventors because the jewel of our civilization is our creative people. Stop creativity and one stays the advancement of the human race. That is why I ask you Senators to give me the relief I've fought so long to obtain. If I have what I claim, no one loses. If I'm dead wrong, and I tell you with all my heart and soul I'm not, then no one loses for I shall fade from sight. But I'm right and I ask you to give me the chance to prove it in the marketplace, to grant me a pioneering patent.

Thank you again for your attention and for this opportunity.

STATEMENT OF JOHN P. FLANNERY, II
BEFORE THE SUBCOMMITTEE ON
ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES
DATED JULY 30, 1986

Thank you Mr. Chairman and the members of this subcommittee for inviting us here today to discuss how the Patent Office has failed to treat fairly or to protect, as is merited the device backwoods inventor Joseph Newman has invented.

I represent Joseph Newman. I am his counsel.

I represent just one inventor, among many, who has spend his resources fighting a tangled bureacracy, rather than devoting himself exclusively to his work.

Mr. Newman, 49, seeks a patent denied him for six years not because the energy device he seeks to patent doesn't work (it does) but because of Patent Office bungling (they ignored their own procedures), incompetence (the patent examiner who rejected his patent application admittedly doesn't have a college level understanding of physics), bad faith (the Patent Office's Deputy Solicitor filed an admittedly false sworn declaration, later recanted, knowing it was false in a desparate effort to rebut Newman), unlawfulness (former Commissioner Mossinghoff misappropriated $100,000 of federal energy monies to discredit Newman by an irregular and unprecedented testing procedure just before Mossinghoff resigned the Patent Office in December, 1984), contemptible and unfair (the Patent Office's expert, the National Bureau of Standards, ran tests behind closed doors in violation of a Court of Appeals Order requiring them to give notice of the tests they intended to run and to complete the tests within thirty days; they did neither).

The U.S. District Court has confessed its technical incompetence, ignored the findings of the Special Master it appointed, seized inventor Newman's property without notice or hearing, and defied the plain language of a writ issued by the Court of Appeals to correct the District Court's "highly irregular" procedures.

As a result of what the executive and judicial branchces have done (and what they have failed to do), this, the legislative branch of government has responded by introducing private legislation in the House that might accomplish what Newman has otherwise been unable to obtain and provided us this hearing in the Senate. We hope that this hearing shall result in the Senate introducing private legislation so that Joe Newman may finally have a fair shot at the marketplace. Again, we thank you for this opportunity.

As you may know, there has been a great deal of media coverage of Mr. Newman's case including magazines like **REGARDIE'S**, local and national newspapers and wire services such as **ABC WEEKEND NEWS**, **CNN**, and even Johnny Carson's **TONIGHT SHOW**. But I thought I might serve this Committee best by summarizing the facts of this case.

I. THE FACTS

A. The Patent Office

What's happened is simple and tragic. Newman holds a number of patents and, in 1980, he applied for another one. But the Patent Office was entirely unable to understand -- at least so they could claim at the outset -- Newman's claim that his device produced more energy out than required to run it.

The Patent Office said you can't do that, that is, get more energy out than you put in. They were, however, dead wrong. Newman's notion is just like what occurs when you strike a match to dry wood; you release more energy from the wood (the fire) than the energy required to get it going (the match). The only difference is that Newman's device doesn't release stored chemical energy (due to photosynthesis) but stored electromagnetic energy (due to permanent and induced magnetic fields).

In 1980, Newman built a prototype proving his device operated. But the Patent Office refused Newman's offer to test it. More recently, they have been somewhat eager to test it but only on their own schedule, without describing the tests beforehand, and only if the public is excluded during the tests. In essence, they refused to test Newman's device fairly, and under circumstances that Newman could afford to attend, and have otherwise defied an appellate court order directing them how to proceed -- but more about that shortly.

The Patent Office ignored the sworn statements of 30 scientists and engineers, including a principal physicist for Sperry Corp., Dr. Roger Hastings, that Newman's device operates as he claims.

In one earlier affidavit by Dr. Hastings, based on several experiments he ran, he found:

(a) for the same input power, Newman's motor ran seven hours as compared with an 80% rated efficient D.C. motor that ran only six minutes,

(b) batteries run down so that they were unable to power even a 1 1/2 volt toy motor, when connected to Newman's device, not only turned Newman's 90 pound rotor, but even caused it to accelerate within only 20 seconds, and

(c) Newman's device -- in 1982 -- measured unprecedented efficiencies of 800% (output/input).

B. The Court

In January, 1983, Newman filed a suit in federal district court in the District of Columbia asking the Court, as is provided for by statute, 35 United States Code, Section 145, to compel the Commissioner to issue him a patent as the Patent Office had refused him one. The case was assigned to U.S. District Judge Thomas Penfield Jackson, appointed to the bench in 1982.

This case was first set down for trial in June 1984. But Judge Jackson said he was incompetent, technically incompetent, to consider the matter, and appointed a Special Master, proposed by the Patent Commissioner, over Newman's objection, to determine if Newman's device operated. The Master, former Patent Commissioner William Schuyler (an electrical engineer), reviewed all the evidence and concluded: (1) there was "overwhelming evidence", without contradiction, that Newman's device operated as claimed, (2) that one "skilled in the art" could make or use Newman's device, (3) that the Patent Office had disregarded its own procedures in denying Newman a patent, (4) that the Board of Patent Appeals decision that Newman's device was impossible was "clearly erroneous" and, (5) as a matter of law, a patent should issue.

Rule 53 of the Federal Rules of Civil Procedure provides that the Judge "shall accept the findings" of the Special Master, but the Court did not. No more technically competent than when the Court appointed the Master, the Judge set aside the Master's findings citing a body of scientific knowledge that he admitted was beyond his comprehension. Judge Jackson also ordered Newman to pay for the Master's services and expenses; so this exercise cost Newman about $12,000.00.

In December 1984, Commissioner Mossinghoff arranged to have $100,000.00 of Energy Act funds misappropriated to discredit Newman's device. Commissioner Mossinghoff made an unprecedented agreement with the National Bureau of Standards. He ran little risk as he already had N.B.S. expert Jacob Rabinow file a sworn declaration that Newman's device did not operate. Rabinow gave this opinion without even testing Newman's device. So the Patent Office ran little risk of the N.B.S. contradicting itself with tests.

We believed as part of pre-trial discovery that they were entitled to prepare their defense but we wanted to know what they were doing so we could defend against their critical claims at trial. It was not reassuring that the supposed national laboratory, the N.B.S., had already said the device didn't operate without ever testing it. Nor was it reassuring this same N.B.S. expert Rabinow sat in on the meeting when the Patent Office struck this agreement with its sister agency, the N.B.S.

Thus did we insist on five safeguards: (1) presence (we be there so we could keep an eye on what the Patent Office and N.B.S. were doing), (2) a limitation on the duration of the test (so that presence was affordable to Newman, his counsel and an expert), (3) destruction (there be none because Newman develops and demonstrates his prototypes and, if the device was destroyed, how could we contradict the results they claimed), (4) that the Patent Office describe in advance the tests they intended to run, and (5) N.B.S. report the results of any "test" they did run.

Commissioner Quigg rejected these conditions out of hand. He asked the Court to order Newman to surrender his device, to exclude Newman from "preliminary tests" -- whatever they were -- and to permit N.B.S. to destroy the device; the Patent Office made the astonishing admission in a letter to Representative Trent Lott that they wouldn't say Newman's device operates until after they had destroyed it. The N.B.S. expert Hebner said the same thing in a sworn declaration.

Judge Jackson obliged the Patent Commissioner and issued the Order as requested.

In October 1985, as I asked the Court of Appeals to stay the extraordinary Order, particularly as Newman would suffer irreparable harm if he was forced to comply. The Court of Appeals issued the stay.

I also asked the Court of Appeals to take the extraordinary step of issuing a Writ of Mandamus.

On January 13, 1986, the Court of Appeals did. The Circuit Court sternly rebuked the District Court Judge for his unprecedented "highly irregular", and fundamentally unfair procedures. In Re Newman, 782 F.2d 971, 974-75 (Fed. Cir. 1986).

The Appellate Court also ordered the safeguards we requested. They said we could be present for all tests, NBS had to tell us what tests they were going to run in advance. They had thirty days, that's all, to run the tests and issue a report. Newman thought he finally had the level playing field he fought for six months to obtain. But as you will see, the N.B.S. and the Patent Office ignored the court-ordered safeguards from the moment Newman timely produced his device on January 24, 1986.

C. The National Bureau of Standards

N.B.S. refused to run a single test unless they were permitted to destroy Newman's device. They told the Court of Appeals before they ran the test, that Newman's device was a hoax. N.B.S. came up with a thousand excuses, each of which Newman answered, to run the clock while they waited for permission to destroy Newman's device. For example, they insisted on communicating by mail, rather than by phone. In another instance, they required Newman to travel 1,000 miles from Mississippi to Maryland to move a wire a single inch. Newman and I told N.B.S. they could connect it. But they insisted Newman do it. Even after Newman did, after he traveled a thousand miles to do it, they refused to test Newman's device or even to tell him when or how they would test it.

The Patent Office and the N.B.S. kept Newman's device for thirty days without running a single test. During that time, the Federal Circuit reaffirmed its decision refusing to let the Patent Office or N.B.S. destroy Newman's device; they issued an unreported Opinion on February 12, 1986. But the Court of Appeals Order made not a bit of difference. The N.B.S. didn't describe or run a single test in the thirty days they were given to do so. On several occasions they asked us to tell them how to run the tests. We refused to tell, although we did tell them how we had run past tests. It is of critical importance that we told them not to connect the device to ground.

On February 24, 1986, when the thirty days the Court of Appeals alotted ran out, without a single test having been described or conducted, I went to pick up Newman's device with the knowledge and consent of N.B.S. Deputy Director Kramer.

But before I could retrieve the device, the Court seized it without prior notice, much less any hearing. Upon arriving at N.B.S. to retrieve the device, I was told that the Court had summoned me to court threatening my arrest if I did not appear in court within the hour. Upon arriving in the court, I was ordered, under penalty of contempt, not to retrieve my client's property. We objected but complied with the Court's order.

On March 3, 1986, as a result of the Court's questionable procedures, Mr. Newman made an affidavit in support of a motion to disqualify the sitting District Judge for his demonstrated personal bias and prejudice.

On March 7, 1986, the District Court held a status conference to consider giving the Patent Commissioner's expert more time to test Newman's device beyond the thirty days authorized by the Court of Appeals. In Re Newman, supra, at 975.

Immediately before the status conference began, the Judge's law clerk handed me an order denying Newman's motion to disqualify him as insufficient but without any discussion as to why the pleadings were factually insufficient. The Judge held me in contempt for merely mentioning our pending motion to disqualify him. During that same hearing the Court allowed the Patent Office to continue to have Newman's device and to test it, day to day, until June 26, 1986, 150 days after Newman's production of the device for testing.

Newman could not afford to be present with counsel and an expert for the 12 hour work-days N.B.S. claimed they worked each day. It would have cost Newman about $60,000, or more, to attend the tests. Former Patent Commissioner Mossinghoff misappropriated $100,000.00 to run these unprecedented tests. The tests, we have been told, cost about $75,000.00. Sure Newman technically had a right to attend the tests, but it was a right he could not afford to exercise. He is not a large corporation. He is an inventor who lives by what he invents.

Worse, the Patent Office earlier said they expect Newman to reimburse the Patent Office what the tests cost.

On June 26, 1986, the Patent Office's expert finally issued its report. Unsurprisingly, the N.B.S. said Newman's device did not operate as Newman claims it does. It is ironic that as a consequence of the Patent Office's disregard of the Court of Appeals requirement that the N.B.S. notify us what tests they intended to run, Newman did not know until after N.B.S. issued its report how N.B.S. "tested" his device. Only afterwards did Newman discover N.B.S. did not test his device at all.

Professor Hastings will say more about this, but, as I said earlier, before N.B.S. ran any tests, I forwarded to N.B.S. a schematic of the circuit used to test Newman's device. It plainly showed not to connect Newman's device to ground. But N.B.S. nevertheless allowed energy to escape from the device, literally to the ground, and then measured the power spent in a load (resistors) wired in parallel to the device. Therefore N.B.S. did not measure the energy produced in (or by) the device itself.

If the Patent Office and the N.B.S. had complied with the Court of Appeals Order, Newman would have had a second opportunity to reinforce what was already obvious from the schematic diagram forwarded to N.B.S., that they should not connect Newman's device to ground. We could have told N.B.S. they were in error. But as N.B.S. and the Patent Office failed to give us any notice of the tests they intended to run, contrary to the Court of Appeals Order, they wasted Newman's resources and, by their estimates, $75,000.00 of federal taxpayer's monies misappropriated by former Commissioner Mossinghoff.

D. The Congress

Newman's device never had a chance in the Patent Office. Nor has Newman gotten a fair shake from the District Court. Nor has the Court of Appeals Order compelled the Court, the Patent Office or N.B.S. to act fairly. The Patent Office continues to spend taxpayer's money in an effort to grind down Newman's resources if they can't otherwise fairly meet and contradict his arguments.

As Newman could not get his "day in court", I asked Congress to give Newman his "day in the marketplace". We respectfully repeat and renew that request today.

That is why Representative Dan Burton (R-Ind.) last October intrqduced H.R. 3590 on Newman's behalf. Joseph Newman seeks a pioneering patent. That is a patent for something that has not been done before. As the Patent Office claims Newman's device is impossible, but we have

proved the contrary, then it is a pioneering patent. The Supreme Court has ruled on 6 occasions since the latter part of the 19th Century that such patents should be liberally interpreted from the narrowest to the widest to interpretation of the claims and as much as possible the claim language will be interpreted in the language of the applicant to uphold the fruits and labor of his genius. This is also why Representative Trent Lott abandoned his postiion that Newman should wait on the outcome of the litigation and last December introduced his own bill identical to H.R. 3590. More recently, Representatives Kindness, Torricelli, Dannemeyer, Tauzin, Daub, Dowdy and Livingston introduced identical private bills. Representative Livingston has called for an investigation of the matter. The House of Representatives has not yet held its hearing, but you have. We are grateful for this opportunity.

II. CONCLUSION

Newman has stated before, as he shall again shortly, that he shall continue to press his case.

We respectfully request that after this hearing, after hearing what we've had to say, and after considering the evidence that the members of this Committee join and introduce a private pioneering patent bill in the Senate so that Joseph Newman may finally have a patent as protection for his work.

Thank you for your attention and, after Mr. Newman and the other members of this panel make their statements, we would all be glad to answer any questions you may have.

NEBRASKA EXHIBITS

[referred to by Mr. Flannery during his Senate testimony]

1. NBS Expert Rabinow's memorandum, dated November 9, 1982.
2. Special Master Schuyler's Report, dated September 24, 1984
3. Court of Appeals opinion, dated January 13, 1986
4. NBS Expert Hebner's declaration with Exhibit D, dated January 22, 1986
5. Court of Appeals opinion, dated February 12, 1986
6. NBS Expert Hebner's letter dated January 28, 1986
7. Mr. Flannery's letter in response with attached schematic (without ground) dated January 30, 1986
8. NBS Expert Hebner's letter, dated January 29, 1986
9. Schematic of NBS Circuit Diagram with excerpts of Prof. Hastings' comments.

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, D.C. 20234

EXHIBIT 1.

November 9, 1982

MEMORANDUM FOR Tom Coultas

From: Jacob Rabinow

Subject: Invention Application 009139 entitled "Unlimited Source of Energy"

I believe that the motor described by the inventor is a very inefficient device and that all the results claimed for it are due to improper testing. There is nothing in the theory of motor design that states that a field winding without iron would produce any result that wouldn't be improved by using an iron structure as is done conventionally.

I think the method of loading the motor was ridiculous and that there is no way of knowing what the load was. The use of a conventional DC motor running at a very low speed to calibrate the oil pumped is a very poor procedure. I believe we should tell the inventor to obtain a good watt meter and use a conventional Prony brake to load the output.

The technique of measuring input by using a double beam oscilloscope can be acceptable but it should be compared to the readings of a watt meter and any discrepancy should be accounted for. I can confidentially predict that the motor efficiency would be quite low, and if all the measurements are done correctly my guess is that the efficiency would not exceed 10%, but this I would not tell the inventor.

DEPOSITION EX. # 4-11
LCSA, BY H NOLAN
Sears

EXHIBIT 11

EXHIBIT 2

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

JOSEPH W. NEWMAN, et al,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	Civil Action No. 83-0001
	)	
GERALD J. MOSSINGHOFF, Commissioner of Patents and Trademarks, in his official capacity,	)	
	)	
Defendant.	)	

REPORT OF THE SPECIAL MASTER

William E. Schuyler, Jr. appointed Special Master in this action by an order of this Court entered August 15, 1984, with instructions to hear and consider the pending cross motions for summary judgment, make recommended findings of fact and formulate proposed conclusions of law, hereby files the following report. This report is based upon a review of the proceeding in the Patent and Trademark Office; a review of the record in this Court; written comments by the parties on a draft of this report which was circulated to them; and arguments at a hearing September 26, 1984.

RECOMMENDED FINDINGS OF FACT

1. Plaintiff, Newman, filed in the Patent and Trademark Office an application for patent Serial No. 179,474 entitled "Energy Generation System Having Higher Output Than Input".

2. Claims 15-43, all of the claims in the application, were finally rejected by the Patent Examiner on January 6, 1982 as failing to comply with the requirements of 35 USC sec. 112.

3. A Third amendment extensively revising the rejected claims was submitted by Newman under 37 C.F.R. 1.116 after the final rejection and was refused entry By the Examiner.

4. The Board of Appeals of the Patent and Trademark Office affirmed the rejection of claims 15-43 as based upon an unproven scientific theory which is contradicted by established and accepted scientific principles.

5. Plaintiff, Newman, being dissatisfied with the decision of the Board of Appeals, brought this Civil Action under 35 USC sec. 145.

6. Plaintiff, Newman, has moved for Summary Judgment seeking:

    1. The relief demanded in the complaint.
    2. Judgment for Plaintiff on novelty alone.
    3. Judgment for Plaintiff on non-obviousness alone.
    4. Judgment for Plaintiff that there is a full and enabling disclosure in compliance with 35 USC sec. 112.

7. Defendant has moved for summary judgment seeking:

    1. Judgment for Defendant that Plaintiff's claims 15-23, 27, 28, 33, and 35—41 are based upon an inadequate disclosure under the provisions of 35 USC sec. 112.
    2. Judgment for Defendant that claims 15, 16, 21-32, 34-39, 42 and 43 are unpatentable over prior art under 35 USC sec. 102/103.

8. Operation of Plaintiff's system seems to clearly conflict with recognized scientific principles relating to thermodynamics and conservation of energy.

9. Evidence before the Patent and Trademark Office and this Court is overwhelming that Newman has built and tested a prototype of his invention in which the output energy exceeds the external input energy; there is no contradictory factual evidence.

10. There is ample evidence that a person skilled in the art could build a system like Newman's prototype by following the instructions of the patent application concerning figures 5 and 6.

11. There is no evidence corroborating Newman's scientific theory involving gyroscopic type energy particles to explain how mass to energy conversion is accomplished by his system; claims which specifically recite that theory were properly rejected.

12. Newman has specifically disclaimed that his invention is a perpetual motion machine.

13. Key to the decision of the Board of Appeals is its findings that a motor like Figure 6 of Newman's application "would not and could not be made to operate at an efficiency level greater than 100% as recited for example in generic claim 43. Such a machine is impossible." That finding is clearly erroneous.

14. There is a genuine issue of fact concerning the operability of Figures 1-3 of Newman's application.

15. There are genuine issues of fact concerning the patentability of Plaintiff's claims under 35 USC 102/103 in view of the prior art.

16. Defendant intentionally did not consider the formalities of Plaintiff's application or the patentability of Plaintiff's claims under 35 USC sec. 102/103.

PROPOSED CONCLUSIONS OF LAW

1. Plaintiff, Newman, is entitled to a patent based upon his experiments and results provided he otherwise complies with the requirements of the Patent Statute (35 USC); it is not necessary that he be able to state the scientific principles underlying his invention, and it immaterial whether he can stand a successful examination as to speculative ideas involved. Diamond Rubber Co. v. Consolidated Rubber Tire Co., 220 U.S. 428, 31 S. Ct. 444. 55 L. Ed. 527 (1911).

2. Even though the operation of Plaintiff's system seems contrary to recognized scientific principles, Plaintiff has demonstrated the operation of his system by very clear evidence and is therefore entitled to a patent if he otherwise satisifies the requirments of the Patent Statute (35 USC). In re Chilowsky 229 F 2d 457 (CCPA 1956).

3. In this suit under 35 USC sec. 145, this Court has jurisdiction under 5 USC sec. 702-704 to consider the appropriateness of the refusal of the Examiner to enter an amendment after final rejection. Sukora v. Brenner 379 F 2d 134 (D.C. Cir. 1967).

RECOMMENDATION OF THE MASTER

It is recommended that Judgment be entered for the Plaintiffs as follows:

1. Plaintiff's Motion for Summary Judgment is granted as to paragraph 4 that Plaintiff's application discloses his invention in a manner sufficient to enable one skilled in the art to make and use it, and the decision of the Board of Appeals is reversed; otherwise Plaintiff's Motion for Summary Judgment is denied.

2. Defendant's Motion for Summary Judgment involves genuine issues of material facts and is denied.

3. In as much as Defendant has not yet examined Plaintiff's application on its merits in accordance with usual practices, and in order that all requirements of the administrative process may be satisfied, Plaintiff's application is remanded to the Patent and Trademark Office for further proceedings consistent with this decision and Defendant is instructed to:

    1. Reopen the prosecution of Plaintiff's application;
    2. Enter the third amendment under 37 C.F.R. 1.116 and conduct proceedings according to Rules of the Patent and Trademark Office as though it was a pending amendment; and

3. Accord Plaintiff an opportunity to prove the operability of Figures 1-3 of the application.

William E. Schuyler, Jr.
Special Master

September 28, 1984

EXHIBIT 3.

In re Joseph W. NEWMAN.

Misc. No. 89.

United States Court of Appeals, Federal Circuit.

Jan. 13, 1986.

A patent applicant petitioned for a writ of mandamus ordering the district court to vacate or modify its orders authorizing the Patent and Trademark Office, through the National Bureau of Standards, to conduct tests of the device for which the applicant sought a patent. The Court of Appeals, held that additional testing of a device rejected by the Patent and Trademark Office as a "perpetual motion machine" could be ordered by the district court; however,

there was no reason why routine safeguards had to be denied or why the National Bureau of Standards had to have the authority to destroy the machine in order to determine if it operated as described.

Petition granted in part.

1. Mandamus ⇐4(3)

A writ of mandamus seeking to compel district court to vacate or modify its orders which authorized Patent and Trademark Office to conduct tests of the device for which the applicant sought a patent was appropriate since no subsequent appeal would necessarily redress any damage resulting from the district court's authorization that the applicant's machine could be destroyed.

2. Patents ⇐114.13

Additional testing of a device rejected by the Patent and Trademark Office as a "perpetual motion machine" could be ordered by the district court under Federal Civil Rule 34; however, there was no reason why routine Rule 34 safeguards had to be denied or why the National Bureau of Standards had to have the authority to destroy the machine in order to determine if it operated as described. Fed.Rules Civ. Proc.Rule 34, 28 U.S.C.A.; 35 U.S.C.A. § 101.

John P. Flannery, II, Washington, D.C., for petitioner.

Joseph F. Nakamura, Sol., Fred E. McKelvey, Deputy Sol., and Thomas E. Lynch, Associate Sol., Office of the Sol., Arlington, Va., for respondent.

Before MARKEY, Chief Judge, and NEWMAN and BISSELL, Circuit Judges.

ORDER

Joseph W. Newman petitions for writ of mandamus ordering the United States District Court for the District of Columbia to vacate or modify its orders dated October 2 and 9, 1985, which authorized the United States Patent and Trademark Office (PTO), through the National Bureau of Standards (NBS), to conduct tests of the device for which Newman seeks a United States patent. We grant the petition in part.

Background

Petitioner Newman applied for a patent on an invention that he entitled "Energy Generation System Having Higher Energy Output Than Input". The PTO rejected the application, on the basis that the device was a "perpetual motion machine" and thus "impossible", (i.e., not useful within the meaning of 35 U.S.C. § 101). Petitioner denies this label, and asserts that his device works as described in his patent application.

A civil action was brought in the district court under 35 U.S.C. § 145. In view of the conflicting representations before it, the district court appointed a Special Master, former Commissioner of Patents William E. Schuyler, Jr., who concluded that the claimed invention met all of the requirements for patentability. The PTO criticized the Master's report, the court held some of the Master's findings to be clearly erroneous, and at the PTO's request the district court remanded petitioner's patent application for a new examination. The patent examiner then rejected the application under 35 U.S.C. §§ 101, 102, 103, and 112, and ordered that a working model be delivered within 30 days to the NBS for testing.

Meanwhile petitioner had sought relief from this remand by writ of mandamus, which this court denied on May 29, 1985 on the basis that interlocutory review was unnecessary because the asserted errors were of a nature that could be corrected on appeal from the district court's final decision. *In re Newman*, 763 F.2d 407, 226 USPQ 97 (Fed.Cir.1985).

On June 18, 1985, at the suggestion of the district court, the Commissioner served on petitioner a request under Rule 34 of the Federal Rules of Civil Procedure. Rule 34 provides in relevant part:

> Any party may serve on any other party a request ... to inspect and copy, test, or sample any tangible things which constitute or contain matters within the scope of Rule 26(b) and which are in the possession, custody or control of the party upon whom the request is served....
>
> . . . . . .
>
> The request shall specify a reasonable time, place, and manner of making the inspection and performing the related acts.

The Commissioner's Rule 34 request required that petitioner promptly transport working models of his device to the Bureau of Standards in Maryland; that the device be relinquished to the NBS for at least seven months; that the device be delivered before the tests and test methods were designed; that only the PTO would be advised in advance of the testing program and who would conduct the tests; that the inventor and his counsel could observe but no expert could be present on petitioner's behalf; that the PTO would control disposition of the working models after the tests, contemplated to be returned to petitioner four days after the trial date; and that the NBS on reasonable notice to petitioner could dismantle or destroy the device.

Upon petitioner's objections, the district court modified the PTO's Rule 34 request in that the NBS was ordered to complete its evaluation and make its report in thirty days rather than seven months; and Newman, his counsel, and one other person would be allowed to observe "any final tests". The NBS was "expressly permitted to render any or all of the devices inoperable in part or in whole if necessary to make its determinations aforesaid", and the requirement that prior notice of dismantling or destruction be given to petitioner was not included in the court's order.

Analysis

Because this court, and only this court, has jurisdiction over any appeal from a final decision in this case, it has jurisdiction to hear and decide this petition. *In re Mark Industries*, 751 F.2d 1219, 224 USPQ 521 (Fed.Cir.1984); *Mississippi Chemical Corp. v. Swift Agricultural Chemicals Corp.*, 717 F.2d 1374, 219 USPQ 577 (Fed. Cir.1983).

[1] Petitioner asserts that the test conditions authorized by the district court are unreasonable, and thus that the order exceeds the district court's discretionary authority. The petitioner alleges irreparable harm if this court does not intervene. We conclude that a prima facie case of irreparable harm has been made by the district court's authorization that the NBS may destroy petitioner's machine, and is supported by other irregularities in the proposed procedures. Mandamus is appropriate because no subsequent appeal will necessarily redress any damage. *See* 9 J. Moore, B. Ward & J. Lucas, Moore's Federal Practice ¶ 110.28 (2d ed. 1985). *See also Schlagenhauf v. Holder*, 379 U.S. 104, 110, 85 S.Ct. 234, 238, 13 L.Ed.2d 152 (1964) (review by mandamus is appropriate in view of the "undecided question" of the appellate court's power in these "unusual circumstances").

Petitioner states that during the course of patent prosecution he had offered the machine to the PTO for testing. The examiner refused these offers, and the deputy solicitor refused to view the machine when he was in Mississippi for depositions in this action. Petitioner asserts that this history shows his past readiness and willingness to produce his machine for testing, and that the PTO having refused these opportunities can not now insist on such tests. Petitioner also states his willingness now to produce the machine, under reasonable conditions.

[2] We have recently held that the PTO is entitled to reject an application for insufficient proof when a device by its nature occasions reasonable skepticism as to its operativeness under § 101. *Fregeau v. Mossinghoff*, 776 F.2d 1034, 227 USPQ 848 (Fed.Cir.1985). *See also In re Langar*, 503 F.2d 1380, 183 USPQ 288 (CCPA 1974). We discern no abuse of discretion in the holding of the district court that additional

tests of petitioner's device should be conducted.

When petitioner had objected to the "extraordinary burden" imposed by the test conditions authorized by the district court, the court responded that this "unprecedented" device "needs precedented [*sic* unprecedented?] procedural adaptations of the Federal Rules". However, the Federal Rules of Civil Procedure are more than guidelines for orderly litigation; they ensure that the proceedings are conducted fairly, with the objective of uncovering the truth, and in accordance with fundamental principles of due process.

We are not told why routine Rule 34 safeguards must in this case be denied, nor why it is essential that the NBS have authority to destroy the machine in order to determine if it operates as described. The record before us contains no allegation that the machine does not correspond with the specification, and we do not here deal with any basis for rejection other than the asserted lack of utility under § 101.

The PTO represents in its brief that the NBS will not dismantle or destroy the device until it has first determined that the device works in accordance with the specification. From this, we assume that the purpose of the destruction would be to determine not if, but how, it works. The PTO is not a guarantor of scientific theory and, although the record shows that the laws of thermodynamics were debated before the district court, it is not the province of the PTO to ascertain the scientific explanation. *See In re Anthauser*, 399 F.2d 275, 283, 158 USPQ 351, 357 (CCPA 1968) (applicant "is not legally required to comprehend the scientific principles on which the practical effectiveness of his invention rests.") Thus, although we encourage petitioner to cooperate in the testing program, at the risk of adverse inferences as mentioned by the district court, we agree with petitioner that his device should not be dismantled or destroyed without his consent.

Rule 34 discovery is a common procedure, as is inter partes testing in general, arising in actions where there is a need to conduct inspections and tests for evidentiary purposes. Such tests routinely are made in the presence of the opposing party, and the test data are routinely provided to all parties. *Wagoner v. Barger*, 463 F.2d 1377, 1382, 175 USPQ 85, 88 (CCPA 1972) ("the results of tests made by one party ... without notice to, and in the absence of, the other party ... [are] for that reason alone entitled to little or no weight"); *Congoleum Industries, Inc. v. Armstrong Cork Co.*, 319 F.Supp. 714, 716, 168 USPQ 263, 264 (E.D.Pa.1970) ("the established doctrine that evidence of experiments conducted by an interested party, in the absence of his adversary, is always received with suspicion and given only negligible probative value").

The objectivity of the tester is a fundamental rule not only of evidence but of conscience. The Bureau of Standards enters this arena with the aura of a national laboratory of scientific distinction, untainted by partisan obligation. Yet the record relates that a spokesman of the NBS criticized to the press the machine that the NBS had not yet tested. Petitioner advises that there was submitted by the PTO to the district court the affidavit of an employee of the NBS, criticizing the machine that he had neither seen nor tested. These events support petitioner's argument that the safeguards of inter partes representation should not be denied.

Petitioner also complains that the PTO has not undertaken, or been ordered, to be bound by the findings of the NBS. However, it is not the PTO but the district court that must decide this case under 35 U.S.C. § 145. The court has not abused its discretion by declining to decide in advance how the test results will be treated.

We conclude that the district court exceeded its discretionary authority in departing from standard procedures and safeguards implementing Rule 34, to the extent that fundamental fairness is absent from the tests as authorized. The court presented no reason for barring petitioner from observing all the tests on his device, or from knowing in advance what tests are to

be conducted. Such procedures are highly irregular, and taint the evidentiary value of the test results. We have been directed to no instance where they have been condoned.

Therefore, IT IS ORDERED THAT:

The stay of the district court's order of October 2 as modified on October 9 is lifted, and compliance therewith is ordered, subject to the following modifications:

(a) Petitioner is to produce his device for testing at the NBS within fourteen days after notification of this order.

(b) Prior to said production date, the PTO shall request the NBS to design a testing program that tests the utility set forth in the specification but does not require dismantling or destruction of the device; the NBS shall notify the parties of that program before testing begins.

(c) Both parties shall have the right to observe all tests.

(d) Upon issuance of the NBS' test report, copies of which shall be supplied to both parties, petitioner's device shall forthwith be returned to petitioner.

In all other respects the district court's order is affirmed. Attention is directed to the requirement that the tests be completed and the report issued within 30 days after delivery of the device.

EXHIBIT 4.

UNITED STATES COURT OF APPEALS

FOR THE FEDERAL CIRCUIT

In re JOSEPH W. NEWMAN) Misc. No. 89

DECLARATION OF ROBERT E. HEBNER, JR.

I, ROBERT E. HEBNER, JR., declare as follows:

1. I am an employee of the National Bureau of Standards (NBS), Gaithersburg, Maryland. Specifically, I am Group Leader of the Applied Electrical Measurements Group, Electrosystems Division, Center for Electronics and Electrical Engineering, National Engineering Laboratory of the NBS.

The following exhibits are referred to in and are attached to this declaration:

Exhibit A: A copy of my resume as of January 1985.

Exhibit B: A copy of pages 1 and 26 of a patent application of Joseph W. Newman.

Exhibit C: A copy of a January 13, 1986 order of the U.S. Court of Appeals for the Federal Circuit.

Exhibit D: A copy of Jones, "I. Fraudulous," New Scientist, Vol. 100, No. 1389, pp. 915-917 (Dec. 1983).

[redacted]
Motion for Extension
Exhibit No. 4

Exhibit E: A copy of page 2' from Newman, The Energy Machine of Joseph Newman, published and distributed by Joseph Westley Newman, Route 1, Box 52, Lucedale, Mississippi (1st ed. 1984).

Exhibit F: A copy of part of page 11 of Vol. 10, No. 1 of a newspaper entitled The Institute, published by The Institute of Electrical and Electronics Engineers, Inc. (Jan. 1986).

2. It is my understanding that Mr. Joseph W. Newman of Lucedale, Mississippi, has filed a patent application seeking to patent a device which is said to result in a greater output of energy than the initial energy input. See (a) page 1, lines 3-7 and (b) page 26, lines 4-10 of Mr. Newman's patent application (Exhibit B hereto).

3. It is my further understanding that the federal courts have ordered Mr. Newman to produce a prototype of the device for which he seeks a patent for testing at the NBS. In particular, I am familiar with an order of the U. S. Court of Appeals for the Federal Circuit dated January 13, 1986 (Exhibit C hereto).

4. I am aware that the Patent and Trademark Office (PTO) has requested the NBS to design a testing program for testing Mr. Newman's prototype and in particular the PTO has requested the NBS to evaluate the efficiency of any prototype which Mr. Newman may deliver. The design of any

testing program to determine the efficiency of any prototype which Mr. Newman may deliver to the NBS for testing and the testing itself would be performed under my direction in the Applied Electrical Measurement Group at the Gaithersburg, Maryland facility of the NBS.

5. On page 5 of its order, the court states that it does not know "why it is essential that the NBS have authority to destroy the machine in order to determine if it operates as described." The court also states that it assumes "that the purpose of the destruction would be to determine not if, but how, it works."

6. NBS conducts scientific and engineering tests and is prepared to conduct a test of the efficiency of any device Mr. Newman may produce. The purpose of the test would be to determine not how, but whether Mr. Newman's device "operates as described" in his patent application. To determine whether Mr. Newman's device operates as described in his patent application, it is necessary to find and to measure all sources of energy input and all energy output. It is unlikely that this can be done without dismantling the device. It is well known (Exhibit D, for example) that the determination of the true energy input to a device can be extremely difficult. A test which does not determine all sources of input energy is scientifically invalid.

7. On page 5 of the court's order, it is stated that there is "no allegation that the machine does not correspond with the specification . . ."

By "machine," I assume the court is referring to the device which might be delivered to the NBS by Mr. Newman. The NBS has not had occasion to determine whether any "machine" made by Mr. Newman corresponds to the invention disclosed in Mr. Newman's patent application. In designing a test program to determine whether any device delivered to the NBS "operates as described" in Mr. Newman's patent application, the NBS would attempt to ascertain whether the delivered device corresponds to the invention described in the application.

8. To design a proper test, the NBS must determine that the device being tested corresponds to the invention described in Mr. Newman's patent application. If there is no correspondence, it would not be apparent why any test should be performed.

9. A scientifically valid test must include finding each energy input source and each energy output source. As shown in Exhibits E and F, Mr. Newman's device may be quite large and the size may make the identification of the input sources even more difficult. Exhibit D underscores the fact that in can be difficult to identify the sources of energy input even in a relatively small and open device. If the NBS were to test any device delivered by Mr. Newman by measuring energy from only nominal energy input and output sources (in this context, the word nominal refers to those energy input and output sources identified in the application), no valid conclusion could be drawn concerning the efficiency of the device. A valid

test may require dismantling or destruction (in whole or in part) of the device. If NBS did not verify that the total energy input was the nominal energy input, NBS could neither substantiate nor refute the correctness of Mr. Newman's claim that his device has a greater energy output than initial energy input.

10. A proper scientific test of any device which NBS is being asked to test requires that NBS be permitted to dismantle and, if necessary, destroy the device being tested. NBS is prepared to proceed with testing. It may be that upon testing, NBS would conclude that the energy output from the nominal energy output sources does not exceed the energy input from the nominal energy input sources. Under those circumstances, dismantling or destruction would be unnecessary.

11. However, if the energy output from the nominal energy output sources exceeds the energy input from the nominal energy input sources, dismantling or destruction (in part or in whole) would be necessary to render a useful report for reasons given above. Because NBS could not conclude that it had measured or considered all possible input energy sources from a mere visual inspection of the device, the NBS cannot conduct a test which is scientifically valid unless the order is modified to permit dismantling the device. Although good faith efforts will be made to preserve the integrity of the device in the attempt to determine the source or sources of energy input, it must be recognized that destruction of the device may be necessary.

12. If the court changes its order, the NBS is prepared to proceed with testing and to give reasonable notice of its need (if any) and intent to dismantle or destroy any device which might be delivered by Mr. Newman. However, if NBS is not permitted, in its discretion, to dismantle or destroy as necessary, NBS cannot perform the requested test.

13. I declare under penalty of perjury that the foregoing is true and correct. 28 U.S.C. 1746.

Robert E. Hebner, Jr.

Executed at Gaithersburg, Maryland
on January 22, 1986

I, Fraudulous

Daedalus's fake "perpetual motion machines" have exasperated many scientists, engineers and students. Our apocryphal friend has divined much of the strength and weaknesses of their thinking from his machinations. He finally comes clean

David "Daedalus" Jones

MY CAREER as a self-confessed fraud and charlatan began in January 1981. That was when *New Scientist* approached me for an exhibit to display on its stand at the British Association meeting in York that September. On the spur of the moment I suggested: "I'll build you a fake perpetual-motion machine. You can run a competition on how it works." And so it was arranged.

Daedalus unveiled: David Jones with his Mark II machine

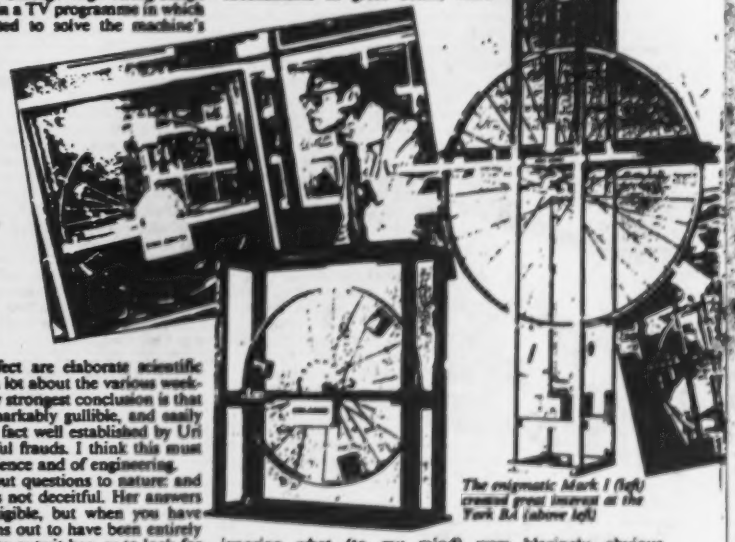
Perpetual motion is, of course, one of the classic impossibilities of science. Every real mechanism needs a source of energy which, sooner or later, must run out. I had undertaken to invent a scientific conjuring trick, a machine whose source of energy and mode of action were carefully concealed. The task was well within the mainstream of my activities—for years I have devised and built scientific demonstrations for exhibitions and TV programmes. The mental deviousness that comes from writing my weekly "Daedalus" column was also clearly going to be required. In fact, I saw the machine very much as a public DREADCO exploit.

It took some time to appreciate the true nature of the challenge. My original conception was for some extremely simple and enigmatic device—a "Naked Impossibility Machine" which would run inexplicably. This line of thought lead me to devise and construct all sorts of cunning little driving-devices which could be tucked away in insignificant corners of such a machine. The experience taught me a great deal, that I did not want to learn, about the inefficiency of small mechanisms and the unreliability of complex linkages. The disastrous failure of my optimised prototype, with only about 10 days to go before the York exhibition, concentrated the mind wonderfully. With the insight of desperation, I realised that the crucial task of any conjuring trick is not to conceal, but to confuse. Simply hiding the drive-mechanism was quite the wrong strategy: the machine had to flaunt misleading clues to a wide variety of possible mechanisms.

I soon devised a new and rather subtle drive-system for the machine—whose moving element was an adapted bicycle wheel—but I complicated it with a number of cunning distractions, each designed to lead the scientific mind along one or other of several false trails. The completed machine first ran just 24 hours before it was due on display at York. Bearing its proud DREADCO label, it ran faultlessly for the whole week of the British Association meeting and later (in a subsidiary *New Scientist* competition) for a month at the University of Newcastle upon Tyne. Well over 100 competitors tried to deduce the mechanism. Greatly to my surprise and relief, nobody got it right: the prizes went to the closest and most cogently reasoned entries.

The Mark I fake perpetual-motion machine attracted a lot of attention. Soon after, some American clients said they wanted one too. So I began work on a Mark II model. It retained the central bicycle wheel but worked on quite a new

principle. Once again over-optimism in the early stages of construction led to last-minute panic-stations as the deadline approached, but in the end the Mark II worked well. The York experience had proved the crucial value of misleading "window-dressing", so the new machine had quite a lot of carefully thought-out elaboration. It was exhibited by *Machine Design* magazine at a Chicago engineering-design exhibition; and it later featured in a TV programme in which two teams of students competed to solve the machine's mystery. Once again, much to my relief, nobody spotted the key secret—though one entrant to the Chicago exhibition clearly glimpsed it, and might have got it almost exactly right if he had known when to stop writing. (It happens in scientific papers, too.) I am presently completing a third machine, operating on yet another principle, and destined this time to run for five years in a glass case in the Ontario Science Centre, Toronto. I am now the world's leading manufacturer of fake perpetual-motion machines!



The enigmatic Mark I (left) created great interest at the York Rd (above left)

This experience of devising and exhibiting what in effect are elaborate scientific conjuring tricks has taught me a lot about the various weaknesses of the scientific mind. My strongest conclusion is that engineers and scientists are remarkably gullible, and easily taken in by conjuring tricks—a fact well established by Uri Geller and many other successful frauds. I think this must arise from the very nature of science and of engineering.

A scientist's main task is to put questions to nature: and nature (as Einstein remarked) is not deceitful. Her answers may not be immediately intelligible, but when you have unravelled them she always turns out to have been entirely fair. There's no point in trying to outwit her, or to look for some hidden, malicious catch. Engineers, if anything, have even more honest instincts. Their creations have to work to specification, in the real world, in the hands of other people, where no subtle fudging or deceit can hope to pay off.

So both scientists and engineers have all the wrong reflexes for penetrating the workings of deliberately deceitful machines. Many of the American engineers I met seemed particularly naive in this way. To guess the driving mechanism of the Mark II machine, they tended to decide on the neatest, most workmanlike engineering solution compatible with the window-dressing, and then looked no further. Two of them—both highly regarded men in their fields—actually asked: "Why does it have to be more complicated?" They completely failed to understand that the prime purpose of a conjuring trick is not to work, but to deceive. No straightforward, obvious engineering solution could hope to be consistently puzzling.

Other engineers had great difficulty in coming to terms with all the window-dressing. Such honest individuals clearly found it hard to conceive of a machine of which large sections serve no useful purpose, and struggled to dream up mechanisms that incorporated all my decorations. One despairing entrant, failing in this task, wrote disparagingly that the surplus details "only attract people's attention, and are at best aesthetic features".

A further common scientific failing seemed to be inflexibility of approach, or perhaps a poor toleration of uncertainty. This I suspect may be a vice of successful, establishment minds. Having decided on a theory, people of this character seized on all the evidence for it, and were strangely oblivious of evidence against it. Thus I had many entries that expounded the details of imagined mechanisms in great detail, while ignoring what (to my mind) were blazingly obvious contradictions.

At York, I overheard one scientist confidently explaining how the Mark I worked by collecting light-energy from certain clearly photovoltaic surfaces: surfaces which—pretty obviously as far as I could tell—were simply sheet-metal painted grey. A variant of this mental attitude was the reluctance of many scientists to take my machines seriously. They were clearly hoaxes: why bother with the petty details?

An honourable exception to these strictures on the scientific mind must be made for David Whiffen, professor of physical chemistry at the University of Newcastle upon Tyne. He was greatly intrigued by the Mark I machine during its run at the University. He presented me, privately, with a remarkable document, in which by careful scientific reasoning he disposed of all the window-dressing and deduced the principle of the machine entirely correctly. At this point, fortunately for me, his sense of technical feasibility let him down.

The mechanism by which he proposed to implement that principle was one which I had in fact tried, and abandoned as intractable. Mindful perhaps of the dignity expected of professors of physical chemistry, he did not enter the competition (the prizes included a *New Scientist* T-shirt), or he would have won it for his tight reasoning and close approach to the solution. But I was grateful for his contribution—it showed that the challenge posed by the Mark I machine was not insoluble or unfair. I also learnt from

his analysis. To a considerable extent, the Mark II was designed to defeat people who reasoned like David Whiffen.

In contrast to scientists and engineers, students and schoolchildren proved most formidable adversaries. I have some theories about why this should be so. First, students and schoolchildren still have a sense of fun. They were intrigued by the notion of a fake perpetual-motion machine, regarded it as an entertaining challenge, and were prepared to put a lot of thought into the problem it posed. Secondly, like all institutional underdogs, students and schoolchildren are entirely used to deceit. It is one of their most important weapons. Fiddling an experiment to get the official answer, or putting up a smokescreen to conceal your real intentions, are parts of their everyday life. And they are constantly being faced with contrived challenges from people like teachers and examiners, who have some unacknowledged motive behind their questions and who are deliberately withholding the required answers. It is almost instinctive to look for catches in such questions, or to try to outwit the intention behind them. Finally, of course, students and schoolchildren are in an almost continuous state of admitted ignorance and uncer-

The Mark II machine (centre) mystified everybody (above) at an engineering exhibition in Chicago and on a US TV show

tainty. To stand any chance of out-guessing the quirky demands of their superiors, they have to keep all sorts of unlikely possibilities constantly in mind.

The answers they dreamed up showed great insight and ingenuity. They found it easy to dismiss whole chunks of mechanism as window-dressing, and several of them came up with new plausible mechanisms I had not thought of myself. The one thing on my side was their poor grasp of technical realities, and the uneven spread of their factual knowledge. They frequently proposed mechanisms that more experienced minds could immediately have rejected as unworkable in practice, and they often failed to complete a chain of reasoning because of unfamiliarity with some technical fact. Some, indeed, were unfamiliar with the law of conservation of energy, and in all seriousness put forward true "perpetual motion" schemes with no source of energy at all!

They were not alone. The most staggering surprise of my career as a perpetual-motion charlatan was to come across people who believed in it for real. I am not sure which is the more astonishing phenomenon: overt "perpetual-motion freaks" who, knowing that perpetual motion is forbidden by scientific laws, assert nonetheless that it is still possible; or working engineers who, in speculative but otherwise unremarkable proposals, can put forward apparently serious perpetual-motion schemes without even noticing that they are violating one of the most fundamental laws of physics. Yet 19 of the 701 entries to the York competition were "perpetual motion" schemes; most of them the innocent products of young or untrained minds unfamiliar with the laws of thermodynamics. At Chicago, at least 40 of the 400 entries posited perpetual motion—and 30 of them were from professional engineers and designers! The outright "perpetual-motion freaks" tended not to enter the competitions—why should they give ideas to a rival?—but they clustered around the machine itself. They were all anxious to welcome me into the brotherhood with congratulations for my great achievement. I protested that my machine was a hoax, and that I was a self-confessed charlatan; even so, I was once accused of lying to protect my secret. I fear that many of the poor freaks must have returned to their workshops with renewed determination. One actually uttered in my presence the archetypal remark of the genre: "All I need are stronger magnets!"

And this was another surprise. The overwhelming bulk of the "perpetual motion" proposals submitted to the competitions, featured permanent magnets. There seems a widespread belief that a suitable disposition of permanent magnets, appropriately arranged to attract and repel each other, will rotate for ever. It ought to be obvious that if you extract energy from a pair of magnets by letting them attract each other, you have to re-supply exactly the same amount of energy to restore them to their original positions (plus a bit more to make up hysteresis losses). Yet this simple fact seems very hard to grasp. I can only assume that the curiously non-intuitive "feel" of magnets in the hands, attracting or repelling each other, paralyses rational understanding.

Fake perpetual-motion machines have a worrying fascination of their own, too. □

Dr. David Jones is a science consultant, and a guest staff member in the department of physical chemistry at the University of Newcastle.

[redacted] 5

Note: This Order will not be published in a printed volume because it does not add significantly to the body of law and is not of widespread legal interest. It is a public record. It is not citable as precedent.

United States Court of Appeals for the Federal Circuit

IN RE JOSEPH W. [redacted]) Miscellaneous Docket No. 89

Before MARKEY, Chief Judge, [redacted] and BISSELL, Circuit Judges.

ORDER

The Commissioner requests reconsideration of our Order of January 13, 1986 that prohibited the dismantling or destruction of the applicant's device by the PTO and the National Bureau of Standards.

The PTO had not demonstrated the necessity for such dismantling or destruction at the time of our earlier Order. Its current request is accompanied by the Declaration of Dr. Robert E. Hebner, Jr. of the NBS, the thrust of which is that the applicant's device may be a hoax, and hoaxes are hard to uncover. Dr. Hebner attached to his declaration an article about a famous hoax, the working of which was difficult to divine.

Dr. Hebner declares that "if NBS is not permitted, in its discretion, to dismantle or destroy as necessary, NBS cannot perform the requested test". Dr. Hebner has not attested to his inability to test the device, or that its structure is concealed, or that a test program can not be reasonably

conducted to ascertain whether the device performs as disclosed in the patent application.

On January 31, 1986 the Clerk of this court received a letter from the PTO Solicitor, enclosing a letter dated January 29 from Dr. Hebner to Mr. Newman's counsel. The letter expressed the view that a simple connection or disconnection as required by the tests may fall within the prohibition against dismantling, and that testing may "destroy" the device. We are confident that the employment of common sense by both parties will result in the conduct of satisfactory tests.

Prejudgment of the Newman device would be unworthy of both the NBS and the Commissioner. A testing program was authorized by the district court in the context of good faith scientific inquiry. Should the device, without dismantling or destruction, be found by the NBS to be in accord with the patent application, including its assertion of utility, no further testing would appear necessary. On completion of such good faith testing, should NBS be unable to determine that correspondence with the patent application, the Commissioner may renew his request to the district court, for good cause shown, that NBS he allowed to dismantle or destroy the device.

Accordingly, on reconsideration we affirm our prior order.

FOR THE COURT

Feb 12, 1986
Date

Pauline Newman
Pauline Newman
Circuit Judge

cc: John P. Flannery, II, Robert Burka,
Fred E. McKelvey

EXHIVIT 6.

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

January 28, 1986

Mr. John Flannery
Judiciary Square
Suite 333
555 Fourth Street, N.W.
Washington, DC 20001

Dear Mr. Flannery:

Your letter of January 24, 1986, to Mr. S. Kramer of the National Bureau of Standards was useful but there is additional information which is needed before the test plan can be developed. The specific information required is summarized below:

1) Upon examination of the device, it was noted that there is a piece of metal, which appears to be a sliding contact or brush, connected to an orange wire and suspended about one to two inches below the rotating white plastic disk (commutator). It is assumed that this brush became dislodged during shipment and should be relocated so that it makes contact with the metal strip on the circumference of the white disk. Please confirm this assumption or provide alternate instructions.

2) Your letter refers to blocks of wood which are stuck under the magnet to hold it rigid and prevent it from turning. When the container was opened, appropriately marked blocks of wood were found in the vicinity of the magnet, but these were not placed so that they prevented the magnet from turning. It is, therefore, possible that the magnet turned during shipment. Your letter implies that if the magnet turns in the wrong direction, the unit may be damaged. Are there any preliminary measurements which should be made to assure that possible rotation of the magnet during shipment did not damage the device?

3) Your letter specifies that the device requires 700-900 volts to operate. We assume that Mr. Newman considers this voltage source to be the energy input to the device for the determination of the device's efficiency. We further assume that a dc voltage should be used. Please confirm the voltage level, the assumption that dc voltage is to be used, and the assumption that this voltage source constitutes the input. In addition, please identify the point at which the output energy should be measured.

In addition to the items above, testing would be expedited if the NBS staff were provided with certain technical information needed to select appropriate test equipment. This includes:

1) A wiring diagram of the device under test.

2) The input impedance of the device or a description of the power source typically used with this device.

3) Details of previous test procedures and results.

Sincerely,

Robert E. Hebner, Group Leader
Applied Electrical Measurements
Electrosystems Division

cc: Fred E. McKelvey
Deputy Solicitor
Patent and Trademark Office

EXHIBIT 7.

John Flannery

Shamrock Farm
Route 2, Box 144A
Leesburg, Virginia 22075
703-338-7248

Judiciary Square
Suite 333
555 Fourth Street, N.W.
Washington, D.C. 20001
202-737-5708

FEDERAL EXPRESS

January 30, 1986

Hon. Sam Kramer
Deputy Director
National Bureau of Standards
Rm B110/225
Route 270 & Quince Orchard Road
Gaithersburg, MD 20899

Re: Pre-trial Discovery in Newman v. Quigg

Dear Mr. Kramer,

We object to the conduct of the National Bureau of Standards thus far on two grounds.

Firstly, we charge that the National Bureau of Standards has already compromised the security you assured us would be provided when Joseph Newman, my client, produced his prototype at 3:10 P.M. on January 24, 1986.

Secondly, the National Bureau of Standards has purposefully delayed testing. Robert Hebner, the group leader, responsible for conducting the tests as part of the Patent Office's pre-trial discovery, is dragging his feet as he has failed to draft and forward to us notice of the tests he intends to conduct -- he said it would be no later than Wednesday, January 29, 1986 -- and otherwise chosen to write us asking: (a) questions he had the answer to before we ever produced the device, or (b) questions he could have asked me in person either on January 24 or 27, 1986, rather than mailing me a letter on January 28, 1986 that guaranteed we would be unable to respond any faster than a couple of days later. Indeed, to save time, having been unable to reach you by phone, I have asked my secretary to read this letter to you and Mr. Hebner and anyone else you wish to have her read it to or repeat its contents to so that we do not waste any more time.

With the scrutiny attendant on these tests, we expected that the National Bureau of Standards ("NBS") would feel constrained to at least appear to act in good faith. As there is sufficient time left of the thirty days authorized by the Court of Appeals for NBS to get down to the business of testing the device produced for that purpose, we urge you to do so in accordance with the very plain language of the Court of Appeals' decision, dated January 13, 1986 (previously supplied) and let us know promptly so that we may arrange to have our expert present.

HON. SAM KRAMER

So that there is no mistake about what security questions or delay concerns us, I have set forth in full exactly what I mean and our responses to your questions.

I. Security

On Friday, January 24, 1986, when Mr. Newman produced the device, I asked what security would be provided and learned that the security consisted of a locked door. When I asked who would have the key, I learned that Mr. Hebner who was responsible for designing and running the tests for the Patent Office would have the key. I objected to this procedure as Mr. Hebner was already on record in a declaration ("the Hebner declaration") submitted to the Court of Appeals as suggesting this was a perpetual motion device and that he had to be allowed to destroy it to test it. At the suggestion of Captain Shackelford, assigned to supervise security for the device, it was agreed that Mr. Hebner would surrender his key to security and it would be maintained by the security force, presumably even after alarms were affixed to the room. When I arrived on Monday, January 27, 1986, so that I could be present as provided for by the Court's order, Mr. Hebner had already entered the purportedly secure area despite assurances he would wait upon my arrival. As he continued to retain custody of the key, I respectfully request assurances from you in writing that the key will from this day forward be retained by the security force and not available to Mr. Hebner or anyone else unless the security force logs in anyone who retrieves the key. Moreover, the key should not be retrieved, nor should there be access to the room in my absence, unless I expressly absent myself, Mr. Newman and the expert we are entitled to have present to observe what NBS does.

II. Delay

Mr. Hebner was present with me when he inspected Newman's device on Friday, January 24, 1986 and he asked me not a word about the device at that time. If he wanted information, he should have asked for it. If he wanted the questions and response memorialized, we could have done that. But instead he said nothing.

Again I was present with Mr. Hebner all day on Monday, January 27, 1986 while he and Dave Hillhouse inspected the device and again he didn't ask me a single question.

Nor did he choose to do so by phone afterwards.

Instead he wrote a letter that you informed me you intended to mail until I insisted at our expense that you forward it Federal Express.

The Patent Office has also supplied NBS with information that answers the questions Mr. Hebner puts to us in writing.

In addition, in the Hebner declaration, dated January 22, 1986, referred to above, Mr. Hebner refers to my client's book, "The Energy Machine of Joseph Newman", and quotes excerpts from that book. Obviously he has a copy of that book and has referred to it. Nevertheless, in Mr. Hebner's letter of January 28th, he asks me questions about the device we produced that are answered in the same book Hebner quoted before we produced the device. And he couldn't have any question that the device we produced on January 24, 1986 is similar, if not identical, as it is not only fully described but also pictured in the same book he earlier quoted (pages 36-39 of "Energy Machine" enclosed).

Finally, let me specifically address Mr. Hebner's questions:

1. The NBS is correct that any brush that has been dislodged, as appears to be the case in the instance cited, should be relocated as all brushes of the commutator should be in contact with the appropriate metal surface of the commutator and Mr. Newman has fully discussed his design of the commutator at Chapter 9 of "Energy Machine", pages 60-70.

2. If the rotary magnet turned the wrong way during shipment, the only thing that would be damaged would be the brushes. They would be disalligned as appears to be the case in the one instance cited.

3. You correctly assume that the 700-900 volt battery source we described in our letter of January 24, 1986 is the energy input for the device and that it is a d.c. voltage just as Mr. Newman made clear when he included the picture, schematic and description of the energy input in Chapter 6 of "Energy Machine", pages 36-39, referred to above and enclosed, and at page 69. As for how Mr. Newman measured energy output, that is described in "Energy Machine".

Mr. Hebner alsd has several items that would "expedite" testing if NBS had the information. Well NBS does have the information:

1. NBS has the wiring diagram and a description of the device, again at pages 36-39.

HON. SAM KRAMER

2. The power source "typically used", as mentioned above, and described in "Energy Machine" is a battery.

3. As for what tests we have run, many have been described in "Energy Machine" and the other papers forwarded by the Patent Office to you, its expert witness, but we would not presume to tell NBS how to design its tests.

Sincerely,

JOHN P. FLANNERY II

ENCLOSURE

cc: U.S. Court of Appeals,
Federal Circuit

U.S. District Judge Thomas Penfield Jackson

Deputy Solicitor Fred McKelvey, Patent & Trademark Office

Chapter 6

Description Of Smaller Unit With An Affidavit By Dr. Roger Hastings

The following is a smaller unit (see photograph 15-C2 below) composed of 30-gauge, insulated, copper wire weighing approximately 145 lbs. (atoms) and having a rotating magnet of 14 lbs. (atoms). This portable unit, with very little current input, clearly demonstrates an energy output which is greater than the external energy input. With 300 volts input of pressure, only 1½ milliamps of current (volume of gyroscopic particles) went into the copper coil (of atoms), which is less than ½ watt input for an energy output in excess of 10 watts.

Photograph 15-C2:

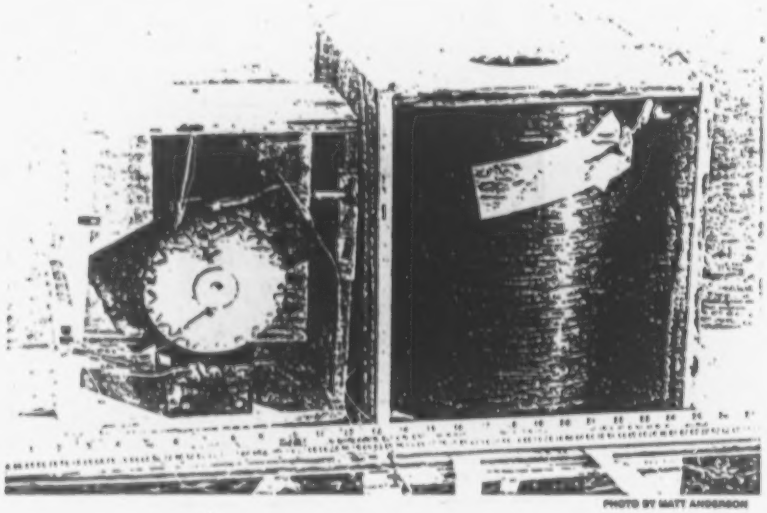


PHOTO BY MATT ANDERSON

See below copy of a test conducted by Dr. Roger Hastings utilizing the 15-C2 unit.

AFFIDAVIT

June 17, 1984

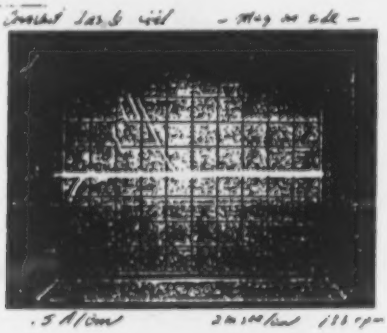
TO WHOM IT MAY CONCERN:

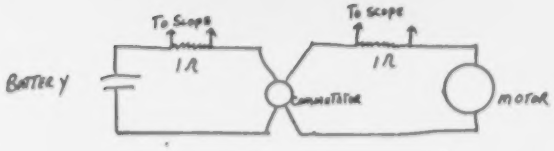
On June 16 and 17, 1984 I ran a series of tests on Joseph Newman's 145 lb. motor with 14 lb. rotary. These tests show that power is generated by the motor which greatly exceeds the battery input power. The results are summarized briefly below:

1. Demonstration of Large Current Spikes Produced by the Motor

A. Oscilloscope Readings

The oscilloscope showed large (>1 Amp) staircase current spikes of significant time duration, which were initiated when the commutator switched, and flowed both in the coil and battery portions of the circuit. A picture of this spike taken on the coil side of the commutator is attached. A block diagram of the circuit is shown below.





B. Circuit Breaker Tests

An ammeter which has a built in circuit breaker was placed in the circuit. When the meter was placed on the 100 ma scale, the breaker opened, both on the battery and coil side of the commutator.

The breaker did not open when the meter was placed on the one amp scale, however, it was verified that a current in excess of more than 1.5 times the full scale deflection did not open the breaker.

C. Temperature Rise

A five hundred ohm risistor was placed in series with the battery. The resistor was water-proofed and placed in a small thermos container with a precision thermometer. A temperature rise of approximately one degree Centigrade was observed in a period of fifteen minutes. To raise the temperature of the 21 grams of water by 1 degree in fifteen minutes requires at least an average power of:

$$P = \frac{1 \text{ cal}}{\text{gm}^{\circ}\text{C}} \times 21 \text{ gm} \times 1^{\circ}\text{C} \times 4.19 \text{ J/cal} \;\Big/\; 15 \text{ min} \times 60 \text{ sec/min} = 0.1 \text{ Watts}$$

Since the power supplied by the current flowing in the resistor is I^2R, where I is the average current and R = 500 Ω, it follows that a current of at least 14 ma on the average must flow in the circuit. This result was verified experimentally by supplying 14 ma to the 500 Ω resistor via a battery and series resistors. If the current contained in the spikes (attached photo) is averaged over the cycle time, the result is consistent with an average current of 14 ma.

2. Demonstration that Large Current Spikes are not Produced by the Battery.

A. Current Readings

When a Simpson amp meter is placed in series with the batteries, a d.c. input current of 1.2 ma is registered. The battery input current is therefore 1.2 ma.

B. Expected Input Current

When the rotor is stopped, the input current from the batteries is measured to be 6 ma (this is in agreement with 304 volts and 50 KΩ coil resistance). The coil inductance, as calculated from the number of wire turns and the geometry, is 16,000 Henries. At the operating speed of 136 r.p.m., the inductive reactance of the coil is 230 KΩ, which is much larger than the coil resistance. The expected battery input current is 304 V/230 KΩ = 1.3 ma, in good agreement with the measured input of 1.2 ma.

C. Constant Battery Voltage

During four hours of continuous running of the motor, the voltage remained constant at 304 volts. If the 15 ma average current contained in the spikes came from the batteries, they would drain down significantly in the four hour period. By

draining 14 ma fr a fresh 9 volt transistor batter dentical to those on the motor it was found that the 14 ma drain causes the voltage to drop by 2% per hour. Thus if the 14 ma were originating at the battery, the battery voltage would drop by 24 volts in four hours. No drop was observed.

D. Larger Current Spikes on Coil Side

The current spikes, as recorded on the scope, were larger on the coil side of the commutator than on the battery side. This indicates that the spikes originate at the coil, with some loss occuring at the commutator.

E. Negative Current

A significant portion of the spike in the battery circuit is negative (opposing the battery voltage). The battery cannot generate such a negative current.

F. Dependence Upon Rotary Position

The intensity of the spikes varies greatly with the placement of the rotary. For example, when the rotor is on the side (outside) of the coil the spikes are large. They virtually disappear when the rotary is placed on top of the coil.

3. Power and Useful Output

A. Output verses Input Power

Since an average of 14 ma flows through the 50 KΩ coil, the heat dissipated in the coil is ten watts. The battery input is 1.2 ma times 304 volts, or 0.36 watts. The heat generated in the coil is 27 times the input power. Note that if the ten watts were delivered by the batteries, they would drain down very quickly. These batteries have been used in frequent demonstrations for long durations by Mr. Newman over the past several months. As mentioned above, four hours of motor operation during these tests did not measureably lower the battery voltage.

B. Useful Output

Mr. Newman placed a 75 Watt, eight foot, flourescent tube across the motor coil, and the bulb lit to perhaps 10% of full brightness. Interestingly, when the bulb was inserted, the rotary gained speed, and the motor drew less current from the batteries! The lit 75 watt tube demonstrates useful output of several watts, with a fractional watt input power.

I swear the above statements are true and accurate to the best of my knowledge.

Roger Hastings

DR. ROGER HASTINGS, Ph.D

Lana D Peters

LANA D PETERS
NOTARY PUBLIC - MINNESOTA
DAKOTA COUNTY
My Commission Expires Mar 19 1988

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

EXHIBIT 8.

January 29, 1986

JAN 3 0 1986

Mr. John Flannery
Shamrock Farm
Route 2, Box 144A
Leesburg, VA 22075

Dear Mr. Flannery:

According to the January 13, 1986, order of the U.S. Court of Appeals for the Federal Circuit, NBS shall design a testing program and notify the parties of that program before testing begins. The general test plan contains five elements:

1) Identify the location and nature of the energy input and output.

2) Develop and calibrate the system used to measure the input energy.

3) Develop and calibrate the system used to measure the output energy.

4) Measure input energy and output energy simultaneously.

5) Report results.

Elements 1-3 will be carried out at approximately the same time. After they are completed Element 4 will be done and the work will be concluded with the completion of Element 5.

At this point, we are prepared to initiate the first experimental measurements in support of Element 2. These will be done in Building 202, Room 157 at the NBS-Gaithersburg site between 8:30 a.m. and 5:00 p.m. commencing Friday, January 31, 1986 or at the earliest time practical following that date. Two items are needed so that we can meet the testing schedule.

First, we need a response from you to my letter of January 28, 1986, regarding possible shipping damage to the device. The effects of any shipping damage should be assessed and corrected before testing begins.

Second, the measurements scheduled for Friday, January 31, 1986, are intended to provide information on the electrical characteristics of the device. Before they can be performed, however, we will need a favorable ruling on the Petition for Reconsideration filed by the Commissioner of Patents and Trademarks on January 23, 1986 for the following reasons. First, the initial measurements require disconnecting the coil from the commutator. This action may fall under the definition of "dismantling" intended in the order of January 13, 1986. Second, it will be necessary to rotate the magnet to test

the commutator. Your letter of January 24, 1986, to Mr. S. Kramer implies that there is a relationship between the motion of the magnet and the destruction of the device. Testing of the commutator may, therefore, fall under the definition of "destruction" as intended in the court order of January 13, 1986.

We are, therefore, ready to initiate testing as soon as you provide the information regarding any required pretest adjustments and the court issues the necessary clarification of its original order.

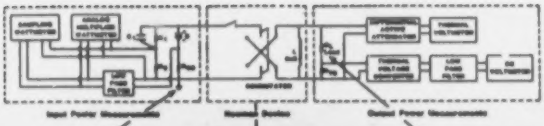
Sincerely,

Robert E. Hebner, Group Leader
Applied Electrical Measurements
Electrosystems Division

cc: Fred McKelvey
Deputy Solicitor
Patent and Trademark Office

EXHIBIT 9.

[SCHEMATIC OF N.B.S. CIRCUIT DIAGRAM WITH EXCERPTS OF PROFESSOR HASTINGS' COMMENTS.]

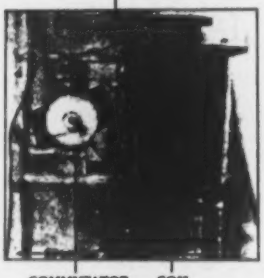


GROUND (NBS shunted energy from Newman Device to ground without measuring it and lost it.)

Prof. Hastings:

"In the NBS testing, the Newman motor was connected directly to ground, thus eliminating the excess r.f. power from the system."

Principal points concerning deficiencies of the NBS test conducted by three individuals



COMMUTATOR COIL

RESISTORS (NBS measured energy spent in resistors but not in or by Newman's Device.)

Prof. Hastings:

"...This is equivalent to stating that the output of an electric motor plugged into a wall socket is given by the power used by a lightbulb in the next room which is on the same circuit."

John Flannery

Shamrock Farm
Route 2, Box 144A
Leesburg, Virginia 22075
703-338-7248

Suite 1200
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036
202-737-5708

August 15, 1986

FEDERAL EXPRESS

The Honorable Thad Cochran, Chairman
Committee on Governmental Affairs
Subcommittee on Energy, Nuclear Proliferation,
and Government Processes
United States Senate
Washington, D.C. 20510

Dear Senator Cochran:

As we have just today been apprised of the correspondence to this Subcommittee by N.B.S. expert Rabinow, and by NBS Director Lyon, permit me to respond.

Mr. Rabinow seeks to write to this Committee because, he says, he "was not a witness at the hearing" but fails to mention he was present at the hearing and when I called during my testimony for any participants from N.B.S. or the Patent Office to come forward, the man sitting next to Mr. Rabinow informed me that Mr. Rabinow left the hearing.

Incidentally, since the Senate hearing, the Patent Office's Deputy Solicitor informed me that Mr. Rabinow will not testify at trial either -- now scheduled for December 8, 1986.

Mr. Lyons insists that Mr. Rabinow had nothing to do with the testing of Mr. Newman's device. To the contrary, former Patent Office Deputy Solicitor Jere Sears gave sworn testimony last year that Mr. Rabinow participated in discussions about the agreement between the Patent Office and the N.B.S. that resulted in the tests we challenge.

No doubt Mr. Rabinow was upset that Special Master Schuyler found that Newman's device operated and that his contrary opinion did not amount to contradictory evidence but it is difficult to understand how he could have overlooked the first of the Special Master's "proposed conclusions of law";

> "Plaintiff Newman is entitled to a patent based upon his experiments and results provided he otherwise complies with the requirements of the Patent Statute (35 U.S.C.); it is not necessary that he be able to state the scientific principles underlying his invention, and it [is] immaterial whether he can stand a successful examination as to [the] speculative ideas involved.
>
> (See, Exhibit 2 to Senate Testimony by John P. Flannery, II)

Mr. Lyons persists in ignoring the information N.B.S. asked us to supply. The excerpt supplied N.B.S., Mr. Hastings' experiment (Exhibit 7 to my Senate testimony) describes the unit tested, the same one supplied to N.B.S., as a "motor", not a "generator".

During the recent deposition of N.B.S. expert Hebner, he testified that the schematic in Hastings' experiment did not show a ground. He said the Patent Office supplied him with copies of all the tests Mr. Newman had run earlier and that none of those showed any ground.

He also testified that Mr. Hillhouse, who assisted him in the testing of the Newman device, drew schematics based on a review of the materials available to the Patent Office and, as is apparent, none of those had a ground (see Exhibit 10 attached hereto).

More importantly, he also conceded during his deposition that the draft plan to test Newman's device of March 11, 1986 did not show a ground (see Exhibit 11).

As for where we get the information that the N.B.S. was getting the funds -- $100,000 -- from the Department of Energy to run these unprecedented tests, that was the sworn deposition testimony of former Patent Commissioner Gerald Mossinghoff who arranged for the funds and this is confirmed by correspondence supplied by the Patent Office at that deposition.

In conclusion, we appreciate the opportunity you have given us to respond to these belated charges from Mr. Rabinow who now won't testify before the Senate or the Court and to the N.B.S.'s remaining charges. We are grateful as well for a hearing in public so that my client may tell the public what has happened to him and to fairness. We're hopeful that now that you've had this chance to review the evidence you will support a legislative remedy for the wrongs Mr. Newman has suffered and thereby prevent their recurrence in the case of any other patent applicant.

Very truly yours,

John P. Flannery, II

JPF/slm
enclosures

EXHIBIT 10

Ex 34 Hebner Deposition

Hillhouse Schematic based upon review of Materials Available to the Patent Office

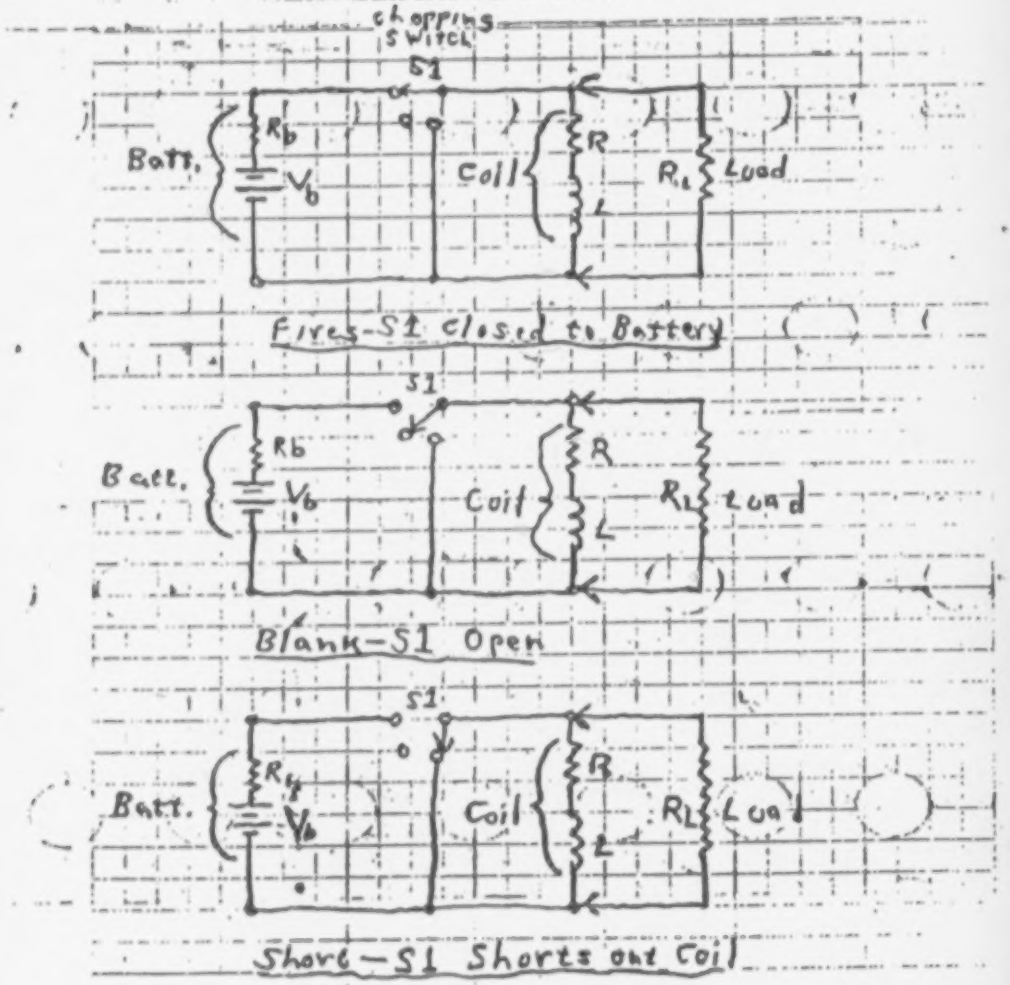


Figure 3-Electrical Circuits for Three Chopping Switch Positions (Claimed by Inventor) 000304

Ex 40
Hebner
Disposition

exhibit 11

Schematic of Draft Test Plan

TEST PLAN---DRAFT---3/11/86
****

Assuming the configuration shown in Figure 1:

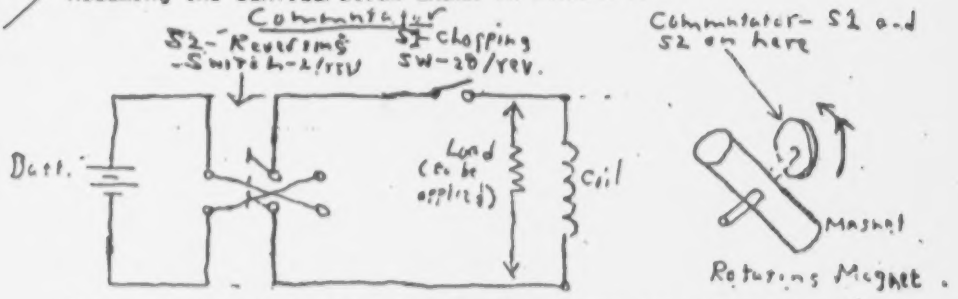


Figure 1. Machine Circuit (as we understand from inspection.

I. Preliminary measurements to characterize the system:

1. Trace continuity of commutator with ohmmeter (How and where is the coil connected?).

2. Document actual machine configuration.

3. Determine battery R with known resistance load, dc VM, AM.

4. Determine the ac and dc characteristics by measuring:
   a. dc resistance of coil, with ohmmeter.
   b. " " " " , " voltmeter (VM) and ammeter (AM).
   c. Measure ac impedance of coil with VM-AM.
      1. Calculate L based on R measurement in (a) to (c), compare with (c) values.

5. Spin the magnet, measure the generated emf in the open-circuited coil.
   a. Use ac VM and/or oscilloscope.

6. Work out GROUNDING problems (Commutator causes battery or coil V to float and to reverse).

7. Once (6) is satisfactory, conduct preliminary runs to capture IØ V and I waveforms via oscilloscope, as follows:
   a. Open circuit.
   b. With pure R loads:
      1. Equivalent to our estimate of approximate input power, based on preceding measurements.
      2. Other pure R loads as experience indicates.
   c. Measure rotational speeds for all the above cases.

STATEMENT OF ROGER HASTINGS, Ph.D.
BEFORE THE SUBCOMMITTEE ON
ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES
DATED JULY 30, 1986

My name is Roger Hastings. Thank you for the opportunity to address this Committee. Before I discuss Mr. Newman's device, let me tell you something about my background, how long I've known Joe Newman, and then I'll make my observations about Newman's device, and repeat my criticisms of the recent N.S.B. tests of Newman's device.

I. BACKGROUND

My education, through the Ph.D., is in physics. I have served as a Professor of physics for four years, and for the past five years I have worked as a physicist for the Sperry Corporation in St. Paul, Minnesota. My current title is Senior Staff Scientist, and I am the manager of Sperry's Superconductive Electronics Technology Center. I have known Mr. Joseph Newman for five years. During this time I have tested most of the many prototype motors which he has constructed, and I have witnessed testing by other technical people. I have become familiar with Mr. Newman's theories and attitudes. I represent myself in this matter, and have never represented Sperry Corp. regarding Mr. Newman or his machine.

II. NEWMAN'S DEVICE

Newman's motors all consist of a very powerful permanent magnet which rotates or reciprocates within or near a coil consisting of a very large number of turns of copper wire. The coil is energized by a battery pack, and the magnetic field produced by the coil provides the torque or force required to rotate or reciprocate the permanent magnet. A mechanical commutator reverses the direction of current flow through the coil each half cycle, and in some models also chops the current input between current reversals. Technically, the motor may be described as a two pole, single phase, permanent magnet armature, d.c. motor. The difference between Newman's design and the prior art is one of scale: very large magnet and very large coil. Newman's large motors contain conventional ceramic magnets weighing up to 700 pounds. His smaller motors use powerful rare earth magnets. The coils typically are wound with more than 100,000 turns of copper wire. Since the coil resistance is therefore high, the machines operate on battery voltage which is sufficiently high (hundreds to thousands of volts).

The torque applied to the magnet in these motors is proportional to the product of the strength of the magnet, the number of turns of copper wire, and the current flowing through the wire. In Newman's machines extremely large torques can be developed with very small current inputs. If we scale up Newman's motor, it is theoretically possible to obtain infinite torques with infinitesimal current flow (and not violate any laws of physics). However, according to conventional thought, as soon as this magnet began to rotate, doing work against

some load applied to its shaft, the back emf (electromotive force) produced by the rotating magnet would produce a back current which nearly cancels the input current, and the torque would be reduced to nearly zero. The magnet could not rotate, or would rotate extremely slowly with the shaft power output less than the battery input.

Consider what has happened to conventional thought in the past when people have experimented with the limits of very high speeds (relativity), very small dimensions (quantum mechanics), very low temperatures (superconductivity and superfluidity). Newman's motors probe the limits of very large torque with very small current input. And they do rotate at relatively high rates. For example, witness Newman's latest prototype (on demonstration following this hearing today in an auditorium in this building) which runs on 0.0008 amps at 3000 volts and turns a 16 inch fan blade at more than 500 r.p.m.. How much torque can this motor produce? Try to stop the motor by holding the two inch diameter shaft. This will not be possible for a normal human, although the motor will never draw more than 0.003 amps or nine watts. This motor is a scale model of a motor which Newman intends to build to power an automobile.

Newman's motors are unconventional in other ways. One notices the flourescent tubes which are placed across the motor coil. These tubes are lit by the coil's collapsing magnetic field occuring when the battery voltage is switched. They are used to protect the mechanical switch from damage due to arcing. The additional power produced in these tubes (and flowing through the system) occurs at very high frequencies, primarily in the range of ten to twenty million cycles per second. This r.f. (radio frequency) current has been accurately measured, and exceeds the battery input current by factor of five to ten in the various motors. One of Newman's motors was monitored with a computerized high speed data sampling system, with the following results:

(1) The r.f. appears in bursts, with the repeat time between approximately equal to the length of the motor winding divided by the speed of light in copper. The r.f. bursts showed little attenuation during their travel through the coil, maintaining their shape and amplitude.

(2) The r.f. current and voltage were in phase, representing the real power.

(3) The r.f. current and voltage waveforms were offset from ground, indicating a net d.c. component.

(4) The net r.f. power at the battery pack represented a negative power which exceeded the d.c. input power from the batteries.

The last statement may explain why Newman has been able to demonstrate the charging of dry cell batteries placed in his system. Battery failure has occured through internal shorts which develop within the batteries rather than by depletion of the energy stored within the batteries. When you witness the demonstration of Newman's latest prototype, if you attend the demonstration following this hearing, bear in mind that the batteries will last many times longer than expected for a drain of 0.0008 amps. A prominent battery company is working with Newman to develop batteries which will stand up to the r.f. power levels, and perhaps last even longer.

Newman's motor design is based on his theory of gyroscopic particles which he explains in his book "The Energy Machine of Joseph Newman". Full utilization of his machine will require a detailed mathematical representation of the phenomena based on a thorough understanding of the atomic processes at work. This will require a parallel program of experimentation using the finest resources available. Application programs have already been conceived (for example the car motor), and will require prototyping and manufacturing efforts. Newman should be immediately awarded a patent and become recognized in the scientific community for his accomplishments to date.

III. AN EVALUATION OF N.B.S. TESTING

I have been asked whether the recent N.B.S. tests alter the opinions I've expressed before and I'm repeating here today. The recent N.B.S. tests don't alter my opinion because N.B.S. failed to test Newman's device.

I have read and evaluated the Newman motor test results reported by R. E. Hebner, G. N. Stenbakken, and D. L. Hillhouse in National Bureau of Standards Report #NBSIR 86-3405. [See "Report of Tests on Joseph Newman's Device", U.S. Dept. of Commerce, dated June 26, 1986, hereinafter referred to as "the NBS Rpt. at ____".]

A. N.B.S.'s Energy "Output" Measurements

While the reporters display fine credentials and demonstrate the use of precision equipment, they obviously did not test the Newman motor. Instead they measured the power consumed in resistors placed in parallel with the Newman motor, and called this power the motor output. [See NBS Rpt. at 7 (Fig. 4. "Schematic Drawing of Newman device and input and output power measurements circuits", reproduced with comments plainly referring to the "Resistors" as such in the accompanying chart.]

In layman's terms, this is equivalent to stating that the output of an electric motor plugged into a wall socket is given by the power used by a lightbulb in the next room which is on the same circuit. The measurement of power consumed by these parallel resistors is clearly irrelevant to the efficiency of the Newman motor.

The actual input power to the Newman Motor (battery input minus power consumed by their resistors) is referred to in the report as "internal losses". No attempt was made to measure the mechanical output of the Newman motor. Nor was any measurement made of heat generated in the motor windings.

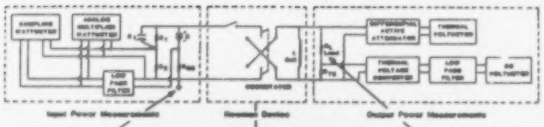
B. The Additional Energy N.B.S. Lost From The System

It has been demonstrated by myself and others that much of the excess energy generated in the Newman machine occurs at very high frequencies (in particular between 10 and 20 MHz). It has also been demonstrated that the high frequency current will flow to the ground if given the opportunity. If Newman's machine is grounded through a high resistance, heat will be produced in the resistor which represents an additional motor output. In the N.B.S. testing, the Newman motor was connected directly to ground, thus eliminating the excess r.f. power from the system [See NBS Rpt. at 7 (Fig. 4. "Schematic Drawing of Newman device and input and output power measurement circuits", reproduced with comments plainly referring to the "Ground" as such in the accompanying chart.] The report states that "the power flow in the device is primarily a low frequency phenomena". This result was guaranteed by the test set up. Again, the oscillographs shown on page 3 of the report show clean low frequency waveforms. All oscilloscope waveforms which I have observed on Newman motors which are properly connected have by contrast been dominated by extremely large high frequency components.

C. Conclusion

In conclusion, the N.B.S. failed to measure the output of the Newman motor, and instead measured the output of parallel resistors. In addition, the primary r.f. energy generated by the machine was shunted to ground. Their measurements are therefore irrelevant to the actual functioning of the Newman device. These results reflect a total lack of communication between the N.B.S. and Newman or any other expert on Newman's technology. Considering the importance of Newman's machine and its potential applications, this waste of N.B.S. resources and misrepresentation of Newman's device is an insult to those seriously interested in the machine and to those who may benefit by its future applications.

[SCHEMATIC OF N.B.S. CIRCUIT DIAGRAM WITH
EXCERPTS OF PROFESSOR HASTINGS' COMMENTS.]

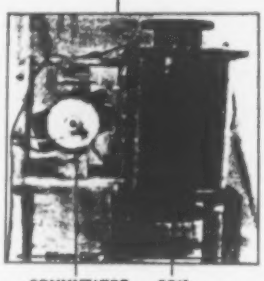


GROUND (NBS shunted energy from Newman Device to ground without measuring it and lost it.)

Prof. Hastings:

"In the NBS testing, the Newman motor was connected directly to ground, thus eliminating the excess r.f. power from the system."

Principal points concerning deficiencies of the NBS test conducted by three individuals



COMMUTATOR COIL

RESISTORS (NBS measured energy spent in resistors but not in or by Newman's Device.)

Prof. Hastings:

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STATEMENT OF MILTON EVERETT
BEFORE THE SUBCOMMITTEE ON
ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES
DATED JULY 30, 1986

Thank you for inviting me to be here today. My name is Milton Everett and I am with the State of Mississippi Geology Department although I am appearing here today on my own behalf.

Throughout Mr. Newman's struggle, one thing that has struck me as astounding for an agency supposedly interested in science is the total absence of curiousity by the Patent Office.

My only direct contact with the Patent Office officials occurred when Mr. Jerry Sears, Soliciter for the Patent Office, attended my deposition at Mr. Newman's Lucedale, Mississippi home.

Mr. Sears assumed an adversarial, not an inquisitive attitude toward me and the others present. I do not believe this is a proper attitude for an official of the Patent Office.

Mr. Sears travel expenses were billed to Mr. Newman and much to my amazement, he was neither interested in seeing or testing Mr. Newman's device.

It became evident in the course of the proceedings that his sole intention was to discredit all evidence in support of Joe Newman's patent.

What I had to say, I suppose didn't suit his purposes. I testified about a water pumping test I had taken part in and in which I found the Newman device efficiency to be 10 times greater than the conventional electric motor. Indeed, the conventional motor's efficiency was about 40% which yields a Newman device efficiency of at least 400%.

I have submitted a number of statements in the three and one-half years I have known Joe Newman. I have attested to the numerous tests I've observed: mechanical tests, electrical tests, and thermal tests.

But let me tell you this. In each and every case where the Newman device has been properly tested, it has shown an efficiency of greater than 100% and I'd stake my professional reputation on that assertion.

STATEMENT OF

A. JACK VITULLO

DIRECTOR OF INVENTIONS AND INNOVATION PROGRAMS

U.S. DEPARTMENT OF ENERGY

BEFORE THE

SUBCOMMITTEE ON ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES

OF THE

COMMITTEE ON GOVERNMENTAL AFFAIRS

U.S. SENATE

JULY 30, 1986

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to appear before you today to discuss the Energy-Related Inventions Program (ERIP). The budget for the program is consistent with the goals and objectives of national energy policy and is fully responsive to the Administration and Congressional goal of deficit reduction.

The Energy-Related Inventions Program was established to fulfill a mandate of the Federal Non-Nuclear Energy Research and Development Act of 1974 (PL 93-577) to tap the creative resources of individuals and small business in improving national energy supply and utilization. This is the only program within the Department of Energy (DOE) directed specifically at supporting individual inventors.
Under this program the National Bureau of Standards (NBS) conducts evaluations through its Office of Energy-Related Inventions. Promising inventions identified by NBS are directed to DOE for further assistance to investigate sources of private sector funding or direct support where private sector support is not available. From program inception in 1974 through 1985 approximately 22,000 energy saving inventions had been evaluated by NBS. Based on NBS recommendations, 224 inventions have been awarded grants totalling $16.1 million. Of these, 36 have entered the marketplace generating sales of approximately $110 million and creating more than 900 direct jobs. In FY 1987, the program will support the analysis of approximately 1000 proposed inventions, and provide financial support for approximately 22 of the most promising inventions.

Program Operations

Inventors enter the program by filing with NBS an application and an invention disclosure. NBS performs a threshold screening prior to evaluation to ensure that all of the following criteria are met:

- the disclosure describes the technical workings of an invention in sufficient detail to allow a technical evaluation;
- the subject invention is related to the production or utilization of non-nuclear energy; and
- the subject invention is not, on its face, a perpetual motion device or based on principles which contradict the laws of science.

On the basis of this threshold screening, 50 percent of all submissions are rejected with a written notification of this action being sent to the inventor.

The 50 percent that are accepted for evaluation enter a two stage evaluation process which examines their technical and economic feasibility, potential impact on energy production or consumption, and practicality. On the basis of the first stage evaluation, which is conducted by NBS, an additional 45 percent of total submissions are rejected with a letter going to the inventor explaining the action and the reasons for it.

The remaining five percent of all submissions are accepted for second stage evaluation. Second stage evaluation involves sequential technical evaluations of the invention disclosure by two independent evaluators. In this second stage of evaluation the inventor and the

evaluators are encouraged to interact directly to ensure that all issues are clarified and resolved. The initial second stage evaluator may suggest specific technical issues to be addressed by the second evaluator. NBS reviews the final reports of both second stage evaluators and makes a determination on whether to recommend the technology to DOE for support. In the case of conflicting assessments from the two evaluators, the inventor is usually recommended to DOE.

At each stage of the evaluation process, an inventor whose technology is rejected is invited to address the deficiency cited in the rejection and may reenter the evaluation process at the stage at which the unfavorable determination was made. Some 15 percent of the inventions ultimately recommended to DOE have been rejected at least once during the evaluation process and, on the basis of additional information provided by the inventor, have ultimately been recommended to DOE. The inventions recommended to DOE for support represent less than two percent of the total submissions received by NBS, though this percentage has been slowly increasing in the past couple of years. The recommendation to DOE includes, besides the technical results of evaluation, an estimate of marketability and potential energy impact.

When an invention is recommended to DOE, the focus shifts from the technology alone to the technology and the inventor because the emphasis at DOE is on development. After an initial reading of the recommendation at DOE, the invention is assigned to an Invention Coordinator who becomes the point of contact for all interactions the inventor has with DOE. Invention Coordinator positions are generally filled by engineers

who have private sector experience and specialize in particular technical areas.

The Invention Coordinator's first job is to become familiar with the technology and get to know the inventor in order to assess the inventor's capabilities and plans for development of the technology. Prior to committing DOE funds to development activities, a logical plan for technical development and ultimate commercialization is negotiated between the inventor and the invention coordinator. The development of this rough road map to the marketplace is usually difficult, due to several factors:

- the typical inventor has extensive technical background and little understanding of the tasks, time, and money involved in taking a product to market; he tends to be overly optimistic about his proximity to success;
- the typical inventor has worked alone in developing the technology and has a vision of continuing to perform all of the tasks involved; and,
- inventions arrive at DOE in all stages of development.

Thus, the Invention Coordinator's focus is on helping the inventor move toward the ultimate commercialization of a product, since the principal objective is to have an impact on the energy picture. This cannot be achieved with a fully developed technology sitting in a laboratory. In conjunction with efforts at this stage, the Invention Coordinator tries to schedule the inventor's participation in a Commercialization Planning Workshop, an ERIP program aimed at sensitizing the inventor to issues which must be faced prior to getting to the market.

As a result of this process, the Invention Coordinator is able to get a rough feel for the types of assistance needed by the inventor, the inventor's level of commitment, business experience, understanding of markets, and available resources - all critical factors in successful development of a technology. Having established a common understanding with the inventor as to the path to be followed, the Invention Coordinator is able to make recommendations as to support for the invention. In some cases both parties agree that for one reason or another, DOE support for the inventor is not desirable. In the great majority of cases, however, an agreement is made with the inventor to proceed with support. Typically, this involves a grant to the inventor to advance the technology through the next logical step or two of technical development. It also involves identifying other resources to the inventor - other DOE programs that may be interested in the particular technology, local technical resources, local business support groups, sources of local professional services, independent testing facilities, potential licensees and trade associations. With the current high level of interest at the local level in technological innovation, we are placing increased emphasis on identifying these resources to the inventor.

For those inventors who receive DOE grants (current average: $70,000) the Invention Coordinator guides the inventor through the procurement process, assisting with the application, advising the inventor on bookkeeping and reporting requirements, and providing liaison with the procurement office. During the life of the grant, the Invention Coordinator tries to make at least one on-site visit to the

inventor to review progress, check technical and financial records, and consult on problems encountered and changes indicated by technical development results or the market. The Invention Coordinator also participates in closing out the grant upon completion, reviewing the final report to assess the possibility of a follow up grant and providing advice to the inventor on next steps.

The relationship between DOE and the inventor has, in many cases, continued long after completion of the grant. We frequently get requests from former grantees for advice or introductions as well as personal letters telling of the variety of successes and disasters that befall any population of innovators. This continuing relationship has in some cases resulted in cross fertilization among ERIP inventors, with one ERIP technology playing a role in the development of another.

OTHER ACTIVITIES

There are two parts of our program that fall outside the mainstream activities of a typical grant program that we feel have been very successful in supporting inventors. One is directed at ERIP inventors as individuals, the other is aimed at supporting the inventor community at large. The Commercialization Planning Workshop (CPW) program was developed by ERIP to expose ERIP inventors to experts from the business, engineering, legal, and academic communities in an effort to heighten inventor awareness of the myriad issues they must address in getting to the market. In this context the CPW forces the inventor to begin a process of self evaluation in order to identify a path most likely to

lead to commercial success and achievement of the inventor's personal goals. To date, 80 ERIP inventors have participated in seven CPW's. Each CPW is a three and a half day session involving roughly a dozen inventors and a faculty of six or seven. During this intensive workshop we cover the subjects of technical development, patents, licensing, business planning, financing, marketing, and entrepreneurship in general. Alternating group discussion of these topics and one-on-one sessions between inventors and faculty to address specific inventor concerns, the focus is constantly on inventor evaluation of personal goals and capabilities in developing their technologies. This activity appears to have been very successful in helping inventors formulate their development plans.

The activity which is directed at the inventor community at large is a program of National Innovation Workshops (NIW). Thus far, 34 of these workshops have been held around the country involving an estimated 8,000 inventors and innovators. The workshops are initiated by request of local groups interested in innovation. Local sponsors have included Small Business Development Centers, inventor organizations, and economic development centers. Funding is provided by the NBS for expenses incurred in organizing the workshops with partial cost recovery from registration fees of participants. The two day workshop includes several plenary sessions and three workshop periods each day. During each of the six workshop periods, participants may attend any of a dozen or so groups on subjects including idea protection, marketing, acquiring capital, product liability, and business planning. The workshops are conducted by volunteers representing the local business

community, academic community, inventor groups, patent attorneys, and local government. ERIP staff conduct several workshops on how ERIP works.

Another activity of ERIP in support of innovation is the ongoing program evaluation effort being headed up by Oak Ridge National Laboratory. The data base of some 22,000 applications to NBS and 350 inventors involved in ERIP represents the largest population of inventor profiles ever assembled. Interest in innovation is more intense now than at any time in the Nation's history; literally thousands of local groups have formed over the last ten years to promote innovation. Yet surprisingly little is known about what makes the difference between success and failure in developing and marketing new technologies. We hope to be able to contribute some understanding on this question as a result of our program evaluation effort.

After eleven years of operation, ERIP has been involved with numerous success stories and has seen a great many ideas in energy innovation that were unworkable. Some inventors have proceeded to the marketplace with ERIP support, generating jobs, tax dollars, and energy savings. Others have, on the basis of NBS objective technical evaluation, ceased spending their personal funds on development of impractical technologies. Given the development cycle of five to fifteen years from concept to market, we anticipate future success for some inventors involved in ERIP today. Most importantly, however, NBS and DOE continue to provide a resource for individuals and small businesses with innovative approaches to energy technology.

Mr. Chairman, that concludes my formal statement. I would be happy to answer any questions that you or members of the Committee may have.

STATEMENT BY THE HONORABLE BILLY TAUZIN
BEFORE THE SUBCOMMITTEE ON ENERGY, NUCLEAR PROLIFERATION AND
THE GOVERNMENT PROCESS
JULY 30, 1986

Mr. Chairman. I am pleased to have the opportunity to testify before the Subcommittee today. While I am not a physicist, I do believe that Mr. Joseph Newman deserves a patent, and I have introduced legislation to grant a patent to his revolutionary energy machine. The reasons are several: some 30 scientists and engineers have filed affidavits in support of his invention; a former commissioner of the Patent and Trademark Office, William Schuyler, has stated there is "overwhelming evidence" that the invention indeed operates; the machine apparently has simply been dismissed by the Patent Office as an invention which cannot work; and because Mr. Newman has been involved in a bureaucratic nightmare, which has consumed more than eight years and countless dollars.

In our nation's history, one can easily recall several inventions which were considered preposterous, impossible and implausible when they were first proposed. Joseph Newman deserves his chance to prove that his machine works. Joseph Newman deserves a patent.

One of the responsibilities of the Patent and Trademark Office is to "promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." The granting of a patent to Joseph Newman falls within this realm, and further reinforces the need to grant a patent to Mr. Newman. He should be allowed to test his invention in the marketplace: to present his product to the consumer where the consumer will determine whether it will succeed or fail.

Five members of Congress have introduced private bills

more

to provide for a patent granting to Joseph Newman. He deserves his opportunity in the marketplace, and he deserves a patent. I thank the subcommittee for allowing me to testify today.

STATEMENT OF DAN BENVENUTI
BEFORE THE SUBCOMMITTEE ON
ENERGY, NUCLEAR PROLIFERATION, AND GOVERNMENT PROCESSES
DATED JULY 30, 1986

Thank you for the opportunity to submit this statement on behalf of Joseph Newman's application to patent his energy device.

President Kennedy challenged us to do what we can for our country and Mr. Newman, as other inventors, does by creating devices that ease the burden that our need for energy has caused. As a result, Newman may dramatically improve our quality of life.

I know Mr. Newman well and I have invested my trust and my financial resources in this man and his work. Let me make a few observations about the man.

He has devoted more than 20 years of his life to his work. He is so dedicated -- and you elected representatives can appreciate this -- that he has not taken a vacation or enjoyed the leisure that most people may enjoy. His work is his pleasure. Thus he has devoted himself to the experimental works of Michael Farady as explained by the mathematics of Maxwell and refined by Einstein himself. Mr. Newman has learned by testing and observing the significance of their teachings and that's how he has made his own experimental discoveries.

The time is past due for the government to sound an urgent call to inventors summoning them forward to share their gifts of knowledge in search of new sources of clean energy.

But let me caution you. We can expect any such call to go unheeded if we cannot assure these men and women of science that the government shall listen to them rather than blunt their enthusiasm and spend their resources in bureaucratic wrangling. That's Mr. Newman's experience, that the government, the Patent Office, does not listen.

We discourage gifted men and women who might participate in solving the problems of the day. We discourage the problem solvers even as the government spends billions cleaning up past energy blunders these gifted men and women might address. The promise of Newman's invention is energy that is without pollution and available inexpensively. Instead we spend money stifling Newman as nuclear disaster occurs halfway around the world. We spend money blocking this inventor as we bury nuclear waste here at home. In short, we spend taxpayers money frustrating Newman when we might save taxpayer's money if we just gave Newman a chance in the marketplace.

Mr. Newman, as other inventors, needs to have his work protected by patent so that investors, who make such work possible, are themselves protected as they risk to invest in the nuts and bolts development of an idea into an invention such as Newman's device.

No government that considers itself fair can sanction by its tolerance the unjust treatment of any man, irrespective of the contribution they have to make, so why does this government tolerate the demonstrated misconduct in the handling of the Newman case? Why has the government suffered this outrage silently?

Except here in Congress. And there is Mr. Newman's hope.

Let me tell you what the Patent Office has told me. In a private meeting in April of 1986, high ranking officials of the Patent Office told me and I quote, "that all patents granted should not be considered to be a stamp of approval for the invention submitted. All investors should be aware of this." So they said. I asked them this question, "What is so different in Joseph Newman's request for a patent? Why not let his work of 20 years be protected? Why not let the marketplace prove or disprove his invention? There is all to gain in granting Joe Newman a pioneering patent." They gave me no response.

Nor do I expect one from them. But I do expect one from you. I ask you to lend your support, as you have already contributed, by hearing the evidence. I ask you to enact a private patent bill so that Mr. Newman can get on with the work God gave him the talent to do.

Your responsibility is as great as the opportunity you have to grant Newman his patent and thereby to encourage other inventors. My prayers are with you and may God bless you. Thank you for this opportunity to submit this statement as part of the record.

PAUL L. GOMORY
5609 OGDEN ROAD, BETHESDA, MARYLAND 20816

320-4327

August 10, 1986

Senator Thad Cochran, Chairman
Subcommittee on Energy, Nuclear Proliferation and Government Processes
Committee on Governmental Affairs
326 SR
Washington, DC 20510

Dear Senator Cochran:

I attended your hearing July 30, 1986.

An experienced patent lawyer, having been variously involved in the field since 1937 I have been concerned to protect, preserve and to perfect (3 P's) our Voluntary Disclosure, Patent Incentive, Invention and Innovation System (VD,PI,I+IS). I have testified before both houses of Congress. An example of my work and testimony, Senate and House, is found in Hearings before the Subcommittee on Courts, Civil Liberties, and the Administration of Justice of the Committee on the Judiciary, House of Representatives 96th Congress, 2nd Session, Serial No. 61, 1980. Kindly see p.416 at foot to p.551. For Senate testimony please see p.488.

I have worked with Capitol Hill to have introduced in both houses legislation to improve our incentive system, drafting bills etc. Indeed, the only substantial improvement in our PTO examination operation, signed into law December 1980, Reexamination of Patents, first appeared in a bill drafted by me in cooperation with then Senator Fong's aide, now Judge Bob Seto of the CAFC. I also worked with aides of other senators, including yours, and aides of congressman including Representative Kastenmeier's aides Herb Fuchs and Bruce Lehman, Mike Blommer, now Executive Director of American Intellectual Property Law Association, priorly administrative aide to Representative Wiggins of California, and others.

For the period 1971-1981 I worked intimately and actively with former Commissioner of Patents Edward J. Brenner in his establishing of Association for Advancement of Invention and Innovation (A^2I^2), serving as a director and advisor of A^2I^2, also acting pro se. I continue to so act. I have testified pro se before various committees and worked directly with senators and congressman and with their staff persons in view of my interest to effect the 3 P's for our VD,PI,I+IS.

I have included reference to some of my activities and experiences to explain the motivation for writing this commentary on the PTO statements, both typed and oral, submitted to you July 30, 1986.

Mr. Joseph Newman was recommended to me by Ralph Oman then counsel to Senator Mathias, later his Chief Counsel of the Senate Judiciary Committee, Subcommittee on Patents, Trademarks and Copyrights, in a phone call by Ralph

who introduced Mr. Newman to me by phone upon hearing Mr. Newman talk about the PTO handling of his case about which he testified before you, together with others including Dr. Roger Hastings. The following day I was retained by Mr. Newman principally to aid him respecting PTO practice.

This letter is on behalf only of the VD,PI,I+IS and to further my efforts to effect the 3 P's. I write to you today to add to the record some facts, readily verifiable by you, which are not in the statement or oral testimony given by the PTO. I have known Mr. Rene Tegtmeyer for a great many years and have found him to be a true gentleman in our many contacts, professional and personal. It seems to me that Rene, perhaps, was not furnished sufficient factual information for his statement and appearance before you.

The PTO procedure, properly applied, as indeed it is in the vast majority of applications filed there, should have resulted long ago in issuing a patent to Mr. Newman, thus carrying out its congressionally mandated duty given it under Article 1, Section 8, Clause 8.

I respectfully remind you that the PTO is not a guarantor of

- patentability
- validity
- operability.

The PTO patenting function is accomplished by following a well-established, highly proper, well-tested and proven procedure. Following this procedure a record, which must be "in writing", is established to be reviewed by any interested person. Persons investing based on issued patents are no different from persons investing otherwise. Persons about to part with their money will consult the established record, pro se, or by employing services of a patent person. I am sure you will agree that all kinds of schemes are perpetrated daily and that the PTO has no mandate to prevent such schemes of which there are a great many and of which, at this writing, I do not recall any based upon an improperly issued U.S. patent.

When the PTO examiner (or Board of Appeals) doubts or questions the useful operability of a claimed invention it is routine procedure - please see Rene's last spoken sentence p.38 - to "rely upon affidavit information submitted by applicant to make an evaluation as to whether an invention has utility or is operable . . ." Nothing in the record before you or elsewhere of which I am aware (including reading p.18 of Rene's typed statement) in any way precludes me from testifying to you, and I would do so in court, that based on Roger Hastings' affidavit the PTO should have issued a patent and should have avoided the tremendous cost of an all too long protracted and unduly extended time and money consuming operation, expensive to the Country and to its progress.

The PTO cannot be expected to be expert at the very forefront of developing technology when a "pioneer" invention is at hand. This is why, routinely, affidavits have been relied upon to avoid an impasse such as the one you are studying.

I come now to points (facts) on which I will elaborate at your request. These points are not made in criticism of the PTO, its personnel or anyone else. We are all human beings, trying to preserve our great, but ailing Country (see A^2I^2 press releases authored by me and printed in the A^2I^2 Journal issues). Mistakes of omission or otherwise, through inadvertence, etc., will be made.

In passing, I note that a qualified, court-appointed Master, an electrically qualified and experienced former Commissioner of Patents, in his Master's Report which, under the rules, should have been accepted in the civil case, even as you have been told by Rene, found the evidence overwhelming that Mr. Newman's machine had been successfully tested, there being ". . .no contradictory factual evidence." As an aside, it remains to be determined, what are the ultimate facts that history will accept. It is precisely for this reason that the PTO, not having withdrawn its objections in view of the Hastings affidavit, which it should have done to avoid protracted litigation to do which its procedure was established, should have siezed upon the Master's report as a golden opportunity to discontinue its dug-in position. Further facts in this letter additionally support my conclusion here expressed.

As a further aside, the "incentive" of our VD,PI,I+IS should be improved. Adverse publicity to the use of the patent system, including of course the PTO, should be minimized to on the whole, on balance, "promote the progress of . . . useful arts," Article 1, Section 8, Clause 8.

I have reviewed the case of Ex Parte De Bausset (1888),a decision of the Commissioner of Patents. With materials available in 1888 an airship to be floated in the atmosphere by sucking from it the air in it clearly could not have been so floated! Query: suppose, some day with feather weight materials a strong envelope is constructed and evacuated only sufficiently to reduce the density of the overall structure permitting it to float, the examiner rejects, an applicant files an affidavit by a duly qualified aviation expert stating that he has taken a trip in such structure!

The PTO's reliance on this case, p.13 of Rene's statement, was satisfied by the Hastings affidavit, not even mentioned by the Board of Appeals in its seven page decision! Nor was Dr. Hastings name mentioned! As more fully developed later herein, in passing, I note that it was the PTO's position that ". . .physical laws are disregarded." page 13, line 5. The Board wanted proof of theory which, though not needed in view of PTO procedure, was clearly satisfied by the affidavit by Dr. Hastings, both ignored as to any reference made specifically to "affidavit" or to "Dr. Hastings". Dr. Hastings appeared before the Board of Appeals at which time the Board viewed a demonstration of a prototype of Mr. Newman's machine. Did the Board inadvertently forget all this? Possibly so. There are other laws of physics on which Mr. Newman relied. For short, $E=mc^2$. This law is consistent with all other currently accepted laws of physics including the laws of thermodynamics, the law of conservation of energy and the law of conservation of mass, as we all know. In face of this I am constrained to question the second full sentence on p.13 and to agree with the third sentence which states in part ". . .applicant must prove operability such as by affidavits of experts,. . ." The requirement for

a model in the Newman case came very late indeed, well after the Board of Appeals decision which should be reversed, all further procedings to be held to have been moot as being beyond what the PTO procedure called for.

The full portion in De Bausset, apparently relied upon by the PTO, is here quoted for convenience. It is to be compared with p.13 lines 1-9.

> "When the question of operativeness is raised in cases of this character it is not to be resolved by ex parte statements or by theoretical argument. The applicant must overbalance the opposing reasons in the judgment of the tribunals having jurisdiction of the case. These reasons may be suggested by the laws of nature or by the testimony of witnesses. In case of evident conflict between the two the former must of course prevail. (Ex Parte Winterlich, C.D., 1879, 240.)"

Clearly there is no conflict between $E=mc^2$ and any other laws of physics. Perhaps the PTO, in its zeal to process applications, in this case, ignored some laws of physics, hastily relying on others to construct the Board's decision.

De Bausset also said, quoted here for convenience,

> ". . . it must be held that a patent must be refused, until applicant practically demonstrates the operativeness of his device."

This was done by actual demonstration before the Board of Appeals, which the decision simply does not mention and, of course, by the Hastings affidavit. The procedure of the PTO and the building of a record before it for the public to later see surely had been satisfied.

I now note other facts in addition to those above noted in this letter to place them in the record before you.

Apparently to set the stage for that which follows the first paragraph of the Board's opinion, citing the Scientific American article dealing with perpetual motion machines which I believe to not exist, then cast its entire decision on the basis of this first paragraph statement. The remainder of the decision, though it refers to mass to energy conversion, Einstein, atomic power, nuclear fission concludes that applicant has not proven his "theory", all the while ignoring that the holding of De Bausset as to required proof and Rene's statement about relying on affidavits were factors in the case.

Before the Board, the Hastings affidavit and the actual demonstration produced a record complying with required procedure.

Having dubbed the Newman invention "perpetual motion" the Board heavily relied, albeit incorrectly quoting the same, upon as it put it ". . .an old textbook[1]: . . .", probably to give the book an aura of importance. Actually, the old physics book dated in 1911 could not possibly have dealt with conversion of mass to energy.

The testimony before you as far as I have been able to find omits mention of the "old" book.

Examining pages 48 and 49 cited on page 3 of the Board's decision one finds that three different paragraphs are involved in the citation from the book. On page 48 only lines 4-8 from foot are found in the decision which you may wish to see for yourself. A separate, complete paragraph beginning at the foot of page 48 and including the first three lines of page 49 is not copied into the Board's decision but is representated by three dots. Admittedly, the next word "The" is capitalized. This led at least one importantly involved person to miss the omitted paragraph until I called it to that person's attention. The omitted paragraph deals with friction between parts of a machine (no doubt mechanical in 1911) and that this friction transforms energy into heat rendering it unavailable to do useful work, albeit concluding "it is not lost, since energy, like matter is indestructible."

The PTO statement - my copy of it - does not mention the book, nor does it attach a copy of the cited pages which were attached to my copy of the Board's decision when I received it in November of 1982 in San Francisco.

Thus, the only physics treatise relied on by the Board was clearly outdated and irrelevent to an application dealing with conversion of mass to energy, even as acknowledged page 5 line 3, Board's decision. This is the treatise not mentioned in the PTO statement.

Finally the old treatise dealt with friction of the parts of the machine and not with electrical phenomena.

It appears to me, having studied physics and advanced physics, including thermodynamics and having in 1982 reviewed my book on the subject, the Newman machine as I understand it and as I understand tne Hastings affidavit does not contradict any laws of physics.

There was a time, long since passed, that there was the phlogiston theory. Thus, although one should be open-minded to receive demonstration of new theories even as appears evident in the Newman situation, one should of course look askance when something entirely new swims into one's ken. This I have done applying my procedure to the facts, all of them, of the Newman matter. I have concluded, as earlier stated, to rely on the Hastings affidavit as satisfying me that PTO procedure had been followed and satisfied by the applicant.

It is of considerable noteworthiness that the Board, which referred to "evidence" but did not acknowledge specifically the Hastings affidavit, nor grapple therewith, nor specifically acknowledge the witnessed demonstration went on to ". . .agree with the examiner's conclusion for reasons that he has presented that the evidence submitted does not overcome the rejection." The Board simply fell in line with the examiner's action!

Yet, nevertheless, the same Board in the first two full paragraphs on the same page 7 wanted that the applicant should have submitted ". . .the THEORY to accredited scientific institutions and to submit papers to scientific journals so that the scientific community <u>at large</u> can evaluate the theory. Then when an

application is filed the results of that evaluation will be available for presentation to the examiner." (Caps mine, underlining by Board.)

Two points. An applicant is not bound to prove any theory. He needs only to prove results in a procedural manner as by filing an affidavit even as stated by Rene in his testimony.

The Board did not accept the actual demonstration nor the Hastings affidavit. Presumably then the examiner seeing the letterhead of the ". . .accredited scientific. . ." institution would simply accept its findings all the while he would still deny the affidavit of a qualified physics professor presently working for a prestigous company as a scientist.

Further, and this is stated all caps for emphasis, THE BOARD TOTALLY MISSED THAT PUBLICATION ANYWHERE IS A BAR TO A VALID PATENT IN VIRTUALLY EVERY COUNTRY UNDER CERTAIN CONDITIONS EXCEPT POSSIBLY CANADA. By way of example, quoting from my Langner, Perry, Card & Langner Foreign Digest, Foreign Patents

"Publication in Great Britain, or public use in Great Britain. . ."

is a bar to novelty which is needed to get a valid patent there. How could an applicant control having submitted his invention to the scientific community "at large" the dissemination of the information about his invention which perforce he would have to disclose along with his "theory", assuming arguendo, that acceptance of his theory is a requirement for patent, which it is not.

In France "Sufficient publicity anywhere to enable the invention to be worked prior to the filing date or the convention date." is a bar to novelty. Again quoting,"This 'absolute novelty' requirement is strict, and any publication, whether printed or not, and any public use may be a bar."

The incentive of our patent incentive system is largely based on the secrecy in which the PTO handles an application. Rene's testimony page 17 line 4.

Without more, it does not appear to me that the Board's decision reflects a knowledge, at least at the time three persons signed the same, of the facts basic to the reason for which applicants file and seek to obtain protection of a patent or for as long as possible during pendency of an application for their inventions which in the interim, if they will disclose the same to others, they will do so in a strictly, restricted, confidential manner.

Thus the Board, in effect, said publish your invention and how it works. When it has been accepted then come to see us.

The PTO should have allowed claims to an applicant who,as they might have but did not view the matter, just might have had something that, truly said, they simply could not understand (I do not fault them for this), relied on them to find ways to bring his disclosures to the public in discharge of the PTO duty to do so if possible, even if along with the granting of claims the Board would have included a however lengthy caveat voicing its concerns.

I have read many Board decisions helpful to an applicant being denied claims by the Board. There is even a procedure for suggesting helpful hints to applicants. Indeed, I have read many well-written Board decisions the reasonings of which have been excellent.

In the Newman case the Board's negative posture is clearly evident to me. Although it acknowledged that applicant's motor could be constructed it blandly stated that such a motor would not and could not be made to operate at an efficiency level of greater then 100%.

In conclusion, I have touched on some but not all of the facts which are in this case or matter but which did not appear in the testimony as far as I have been able to find.

I will of course be glad to discuss any questions which you may put to me.

I have simply discussed procedure which exists in the PTO, is of long standing and should have been followed in the Newman application.

Finally, I enclose also for the record, a letter from former Commissioner C. Marshall Dann simply that you will have before you an example of my overall views of the work of the PTO and of his views of my work to ". . .uphold and improve our Patent System."

Respectfully submitted,

Paul L. Gomory

320-4327
plg:mbg

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

June 2, 1986

By Hand

Mr. John P. Flannery, II
1000 Connecticut Ave., N.W.
Washington, D.C. 20036

Re: Newman v. Quigg
Civil Action No. 83-0001

Dear Mr. Flannery:

This is a followup on our phone conversation today regarding the testing of Mr. Newman's prototype at NBS.

At 10:30 AM today, Dr. Hebner of NBS called Mr. Lynch to indicate that simultaneous measurements of the input and output power of the Newman device would be conducted on Tuesday June 3, 1986, beginning at 9:30 AM.

Sincerely,

Fred McKelvey

Fred E. McKelvey
Deputy Solicitor
P.O. Box 15667
Arlington, VA 22215
(703) 557-4035

cc: Dr. Robert Hebner
National Engineering Laboratory
National Bureau of Standards
Gaithersburg, MD 20898

Samuel Kramer, Deputy Director
National Engineering Laboratory
National Bureau of Standards
Gaithersburg, MD 20898

JACOB RABINOW
6920 BELIORK DRIVE
BETHESDA, MARYLAND 20817
(301) 229-0594

1986 AUG -6 PM 1:47

Honorable Thad Cochran
United States Senate
Washington, DC 20510

Dear Senator Cochran:

Subject: Joseph Newman's Energy Machine

At the hearing of July 30, 1986, on the above subject, Mr. Newman's attorney Mr. John Flannery mentioned my name many times. The references were far from complimentary.

Because I was not a witness at the hearing, I'd like to state the following for the record:

As can be seen from my enclosed Biography, I have been an electrical engineer for over 53 years and consider myself fully qualified to render an expert opinion on a device such as Mr. Newman's.

I did evaluate Mr. Newman's submission to the Office of Energy-Related Inventions (OERI) of the National Bureau of Standards (NBS).

I was then, and still am, of the opinion that the device is an attempt at perpetual motion. I recommended no support.

I am of the firm conviction that Mr. Newman's theories of electromagnetism are without foundation in science and that his electromagnetic motors and related "devices" do not produce more energy than they consume. I am also absolutely sure that the motors that he demonstrated on TV and that he submitted to NBS are very inefficient as motors, i.e., as converters of electrical energy to mechanical power. (The efficiencies of Mr. Newman's devices as electromagnetic inductors are fully covered in the NBS recent report.)

Some time before NBS was asked to test Mr. Newman's device, I was asked by the Legal Council of ~~the Patent Office~~ whether I would be willing to be an expert witness on the side of the Government in the pending court case. I agreed.

The Legal Council provided me with copies of some court documents filed by Mr. Newman, documents that supported his claims for extraordinary efficiency of his "device".

I found the main supporting documents highly deficient in technical details. The document also contained statements that cast doubt on the expertise of the "experts". Copy of the pertinent pages of my statement for the court is enclosed.

Mr. Flannery has suggested that the NBS tests of the Newman device were, somehow or other, influenced by my evaluation of Mr. Newman's device. These assertions are without foundation. Dr. Ambler, the Director of NBS, gave me explicit directions to have nothing to do with the tests. I was not to see the machine, nor talk to anyone connected with the tests. I followed these instructions to the letter.

Mr. Flannery is also incorrect when he states that the Master recommended that Mr. Newman should be issued a patent. A copy of the Master's Recommendation is enclosed.

Sincerely,

Jacob Rabinow

Jacob Rabinow
Reemployed Annuintant at the National Bureau of Standards

Enclosures

cc: Senator John Glenn

BIOGRAPHY
Jacob Rabinow

Jacob Rabinow was born in Kharkov, Russia, on January 8, 1910. After what he calls a too eventful life as a child in European Russia and Siberia during the revolution, his family moved to China in 1919 and finally came to the United States in 1921. He was educated in the schools of New York and graduated from the City College of New York in 1933 with a BS in Engineering, and with a graduate degree in Electrical Engineering in 1934.

Jacob Rabinow spent the depression years at various jobs and finally was appointed as a Mechanical Engineer to the National Bureau of Standards in 1938. Here he worked on a great many ordnance devices during the war and rose rapidly through the ranks to become Chief of the Electro-Mechanical Ordnance Division.

In 1954, he left the Government to form his own engineering company. Ten years later, in 1964, his company joined Control Data Corporation and until 1972 he was Vice President of that company and Head of the Rabinow Advanced Development Laboratory.

In March 1972, he rejoined the National Bureau of Standards and held several positions, among them that of Chief Research Engineer, National Engineering Laboratory.

In August 1975, Mr. Rabinow retired from full-time Government service and is now a reemployed annuitant at the National Bureau of Standards. His main duty is the evaluation of inventions submitted to the Office of Energy-Related Inventions.

Jacob Rabinow holds 221 U.S. patents on a very wide variety of mechanical and electrical devices. Among these are the automatic regulation of clocks and watches formerly used in all American automobiles, the automatic letter-sorting machine used by the U.S. Post Office, the magnetic particle clutch, the "best-match" principle in reading machines, many safety mechanisms for ordnance devices, and the straight-line phonograph.

For his scientific work, he holds the following honors:

The Exceptional Service Award of the Department of Commerce (1949); the President's Certificate of Merit (1948); the War Department's Certificate of Appreciation (1949); the Naval Ordnance Development Award (1945); a Certificate of Commendation from the NDRC (1945); the Edward Longstreth Medal from the Franklin Institute (1959); the CCNY Engineering School's 50th Anniversary Medal (1969); the Jefferson Medal Award from the New Jersey Patent Law Association (1973); a Certificate from the American Patent Law Association (1973); the IEEE's Harry Diamond Award (1977); the Industrial Research and Development Scientist of the Year (1980); Doctor of Humane Letters, Towson State University, 1983.

He is a member of the National Academy of Engineering, the Cosmos Club, the Philosophical Society of Washington, the Sigma Xi, a Fellow of the IEEE, and a Fellow of the American Association for the Advancement of Science.

Additional information regarding my experience: I had very thorough training in the design of electric motors and generators during my college career, particularly during my graduate year after I received my BS Degree. I majored in the design of motors and generators, specifically to ascertain the highest possible efficiencies. The highest efficiencies possible are of the order of 95%.

During the four years between my graduation in 1934 and my joining the National Bureau of Standards in 1938, I worked, among other places, at the Federal Power Commission as a Junior Electrical Engineer and as a Draftsman and Engineer for Gibbs and Hill Corporation on the electrification of the Pennsylvania Railroad.

After I joined the National Bureau of Standards in 1938, I was transferred to Ordnance in the summer of 1941. Because of my ability to invent both electrical and mechanical machinery of all types, I rose to the position of being chief of one of the three Ordnance Divisions. My specific title was Chief, Mechanical Ordnance Division, and we were concerned not only with the physical design of proximity fuses, guided missiles, rockets and other devices but specifically with the design, development and testing of power supplies for these items. My staff and I designed many generators, turbines, gyroscopes, electromagnetic clutches and brakes for powering these devices.

I left the Bureau to open my own Consulting Firm in 1954 and worked for many clients on a wide variety of technical problems and eventually became Vice President of Control Data Corporation. I rejoined the National Bureau of Standards in 1972 where I held various positions, including that of Chief Research Engineer of the National Engineering Laboratory of that Bureau.

I now have 221 U.S. patents and something like 100 in foreign countries. Of these, 27 are directly related to electromagnetic machines. I am the inventor of the magnetic particle clutch which is a basic invention and which has led to hundreds, perhaps thousands, of other inventions made by a great many people all over the world. My invention was the nucleus of a new sub-class in the Patent Office, a fact of which I am very proud. The device is used in automobiles, airplanes, and many other machines.

Methods of Testing Efficiency of Motors

The techniques for testing motor and generator efficiencies are well known and are covered in nearly all the classic books on the subject. The basic method used nearly universally is to use a watt meter which measures directly the instantaneous product of current and voltage and produces a direct reading of the power. These instruments work on a instantaneous product and read power in both positive and negative directions.

The mechanical output of a motor can be read in several ways. The simplest is by the use of a Prony Brake which is simply a friction device which measures the torque of an output wheel in units such as ft. lbs. At the same time, the speed of the output shaft is measured in many ways. It can be measured by counting the revolutions against the clock if a speed is low. If the speed is high, it can be measured by means of suitable stroboscope or various other devices.

Another way of loading a motor would be to connect an electrical dynamometer to the output shaft of the motor. The dynamometer is a generator which can be loaded by resistors or otherwise, and the torque is measured by having the dynamometer mounted on the knife edges or special bearings, and again the output torque is measured by spring scales as with a Prony Brake.

In order to eliminate vibration or oscillation of the torque, as can be expected with certain friction loads, damping devices such as dash pots can be employed.

If two windings are used in the single field structure, as done in one of Mr. Newman's machines, one produces a dynamotor. Such devices are well known in the art and are used to convert one DC voltage to another or a DC voltage to an AC voltage. In such cases, the revolving magnet produces a generator action in the second winding while acting as a motor with the first winding. There is also electromganetic coupling between the two windings. If the second winding uses a rectifier or a commutator, the second winding can also produce direct current, although Mr. Newman's device does not.

It is my opinion, since Mr. Newman does not use a tightly coupled iron structure around his armature that the efficiency of his motor should be very low when used purely as a motor. This brings me to the test made as reported by Mr. Bolger and Mr. Meatyard.

65-446 O - 87 - 7

I have before me the two affidavits by Bolger and Meatyard which are surprisingly similar in their discussion of the test they observed on Mr. Newman's machine. The reports omit many items that would be of great interest to me. For example, what were the connections of the scope? Were they connected to the DC or to the AC input either on the voltage or the current scale, or on both? Second, what scale settings were used? Specifically, it would be interesting to know if the reverse current severely overloaded the input, as hinted in their drawings.

I am particularly curious why the calculation of average input power by Mr. Meatyard, as shown on the bottom of page 2, is in mechanical units such as joules when the readings from the scope were obviously in electrical units. Why and how did he convert?

In the photograph of Exhibit 3 and in the handmade sketch of Exhibit 4 of the oscilloscope reading on pages 4 and 5 of the same report, the battery voltage is stated to be approximately 150 volts. Yet, the voltage rise due to negative current is very small (that is, when the battery is being charged by presumably a negative current). Normally, when a battery is being charged by current flowing into it, as during charging, the voltage rise is usually by an order of about 15%. This does not appear to be the case in the drawing of Exhibit 4.

In the affidavit signed by Mr. Meatyard dated September 1983, he states in the third paragraph on page 2: "An inspection of Exhibit 3 of my November 9, 1983 affidavit indicates that the voltage of the battery increases slightly during the duration of the current spike. This is expected when current flows in a charging direction through a battery. This could not occur from a discharging current." (The emphasis is mine.) Mr. Meatyard is incorrect in the last sentence of his statement. If current is drawn from a battery and if for any reason the amount of current is reduced as, for example, during a commutating cycle, the voltage will indeed rise, and if no current at all is taken the voltage will rise to the no-load voltage of the battery. If the current is reversed so as to charge the battery, the voltage will rise still further as stated by me above. It is, therefore, obvious that if "the voltage of the battery increases slightly" as shown and stated in the affidavits, this indicates that the current did not in fact reverse but was simply reduced in magnitude.

It seems to me that if there were a very large negative current, as stated in the two reports, it would have been easily possible to connect the large capacitor across the battery and let the negative current charge this capacitor. This current could have been kept out of the battery by the use of a simple diode rectifier. This means that the battery could supply power to the motor, but not receive the charge. If the reverse current and power were greater than that consumed by the motor, the battery could then be disconnected after the initial start and the motor would run indefinitely with the battery disconnected. This would prove Mr. Newman's theory.

2

If the current were measured through AC coupling to the scope, then the positive or negative currents as seen in Exhibit 4 would be meaningless because the scope would simply not show the DC current taken continuously and the AC components could be as large as one observes and would have nothing to do with the average power taken by the motor. This would also explain why the one ohm resistor would heat up the water bath while the small positive current component of the AC as seen by the scope would not.

RECOMMENDATION OF THE MASTER

It is recommended that Judgment be entered for the Plaintiffs as follows:

1. Plaintiff's Motion for Summary Judgment is granted as to paragraph 4 that Plaintiff's application discloses his invention in a manner sufficient to enable one skilled in the art to make and use it, and the decision of the Board of Appeals is reversed; otherwise Plaintiff's Motion for Summary Judgment is denied.

2. Defendant's Motion for Summary Judgment involves unresolved issues of material facts and is denied.

3. In as much as Defendant has not yet examined Plaintiff's application on its merits in accordance with usual practices, and in order that all requirements of the administrative process may be satisfied, Plaintiff's application is remanded to the Patent and Trademark Office for further proceedings consistent with this decision and Defendant is instructed to:
    1. Reopen the prosecution of Plaintiff's application;
    2. Enter the third amendment under 37 C.F.R. 1.116 and conduct proceedings according to Rules of the Patent and Trademark Office as though it was a pending amendment; and
    3. Accord Plaintiff an opportunity to prove the operability of Figures 1-3 of the application.

William E. Schuyler, Jr.
Special Master

ADDITIONAL INFORMATION
ABOUT THE

NBS/DOE ENERGY-RELATED INVENTIONS PROGRAM
SUBMITTED TO

UNITED STATES SENATE
COMMITTEE ON GOVERNMENTAL AFFAIRS

SUBCOMMITTEE ON ENERGY, NUCLEAR PROLIFERATION,
AND GOVERNMENT PROCESSES

FOR THE RECORD

- The NBS/DOE Energy-Related Inventions Program
  What it is and how it works. *
- The NBS/DOE Energy-Related Investions Program
  Synopsis of Evaluation Process *
- A Federal Program for Inventors
  The Energy-Related Inventions Program
  by Marcia L. Rorke, Mohawk Research Corporation, and
  Harold C. Livesay, Virginia Tech.
- Innovation - Analyzing the Process
  by George P. Lewett, Chief, Office of Energy-Related
  Inventions, NBS
- The Energy-Related Inventions Program
  An Overview of the Evaluation
  Oak Ridge National Laboratory*

* These publications may be found in the
Subcommittee files.

INNOVATION - ANALYZING THE PROCESS*

by
George P. Lewett, Chief, Office of Energy-Related Inventions
National Bureau of Standards

INTRODUCTION

This panel discussion is based on findings and projections from operation of the Energy Related Inventions Program (ERIP) which is conducted by the Department of Energy (DOE) and the National Bureau of Standards (NBS). In ERIP, NBS' focus is on evaluation to select inventions for DOE support (investment); DOE's responsibility is invention development towards commercialization. The Program works only with invention from the private sector, principally from individuals and very small business.

In ERIP, the Government role is to facilitate operation of the private-sector small business innovation process. While many major inventions have come from individuals and very small businesses, the general lack of credibility of the individual inventor and the very small business is a deterrent to potential supporters. ERIP is designed to counter this barrier.

In addition, however, the program also serves as a "test-bed". That is, data are developed and insights gained as to significant factors involved in the overall national innovation process; activities are then initiated to stimulate and improve process operation. This presentation is to call attention to this facet of ERIP, and to two specific areas in which activity could have a favorable impact on innovation.

THE ENERGY RELATED INVENTIONS PROGRAM

ERIP was established in 1975. Independent inventors and small businesses submit energy-related inventions to NBS's Office of Energy-Related Inventions (OERI). OERI evaluates them and recommends those which meet technical, commercial, and energy-related criteria to the DOE for possible Government support.

Since inception we have received some 22,000 evaluation requests, accepted about half of these for evaluation, and recommended 320 for Government support. Approximately $14 million in grants or contracts have been awarded to date on some 200 recommended inventions; the remainder are either in process or have received other than financial assistance.

Operation is continuous; we are currently reviewing about 100-200 inventions a month for evaluation and we recommend, fairly steadily, 2-4 inventions per month. I would like to summarize operations as shown in Figure 1.

As you can see, for every 1000 invention evaluation requests received, 15 are recommended to DOE after completion of three screening steps--the first to either accept for evaluation or not; the second a brief technical screening to identify promising inventions; the third an in-depth analysis examining both technical and commercial feasibility. Our objective in supporting recommended

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*Notes for a panel discussion on this topic at the First International Technical Innovation and Entrepreneurship Symposium, September 11-13, 1985, Salt Lake City, Utah

INNOVATION - ANALYZING THE PROCESS*

G. P. Lewett

INTRODUCTION

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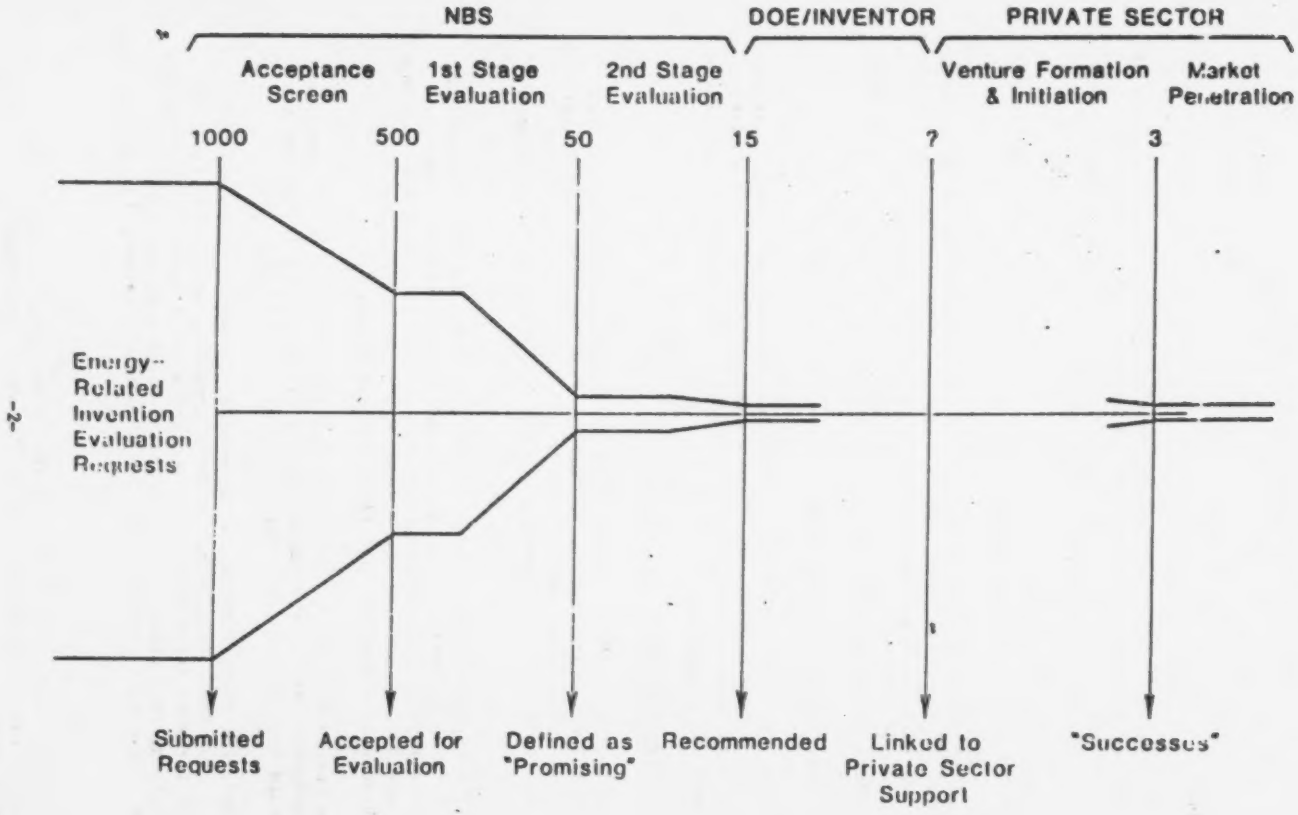
NBS
DOE/INVENTOR
PRIVATE SECTOR
Acceptance Screen
1st Stage Evaluation
2nd Stage Evaluation
Venture Formation & Initiation
Market Penetration
1000
500
50
15
?
3
Energy-Related Invention Evaluation Requests
Submitted Requests
Accepted for Evaluation
Defined as "Promising"
Recommended
Linked to Private Sector Support
"Successes"

Figure 1

inventions is to bring them to the point where they can exist in the marketplace on their own i.e.; to the point where private sector sources of support or the marketplace takes over. We find that about 20 to 30% of those recommended (3 in the chart) end up as being, to some extent or another, "successful."

The support process to do this, as you know, is not easy. The gap between recommendation and private sector pick-up can be difficult to close. Figure 2 pictures how this problem varies with the stage of development of the recommended inventions.

As Figure 1 indicates, responsibilities of DOE and NBS in our joint program are clearly distinguished. DOE is responsible for activities aimed at fostering usage i.e. commercialization of recommended inventions--the more difficult part of the job, in my opinion; NBS is responsible for evaluation and for supplementary activities aimed at increasing or maintaining input to the evaluation process. In effect, NBS focuses on "invention" and DOE on "innovation", defining innovation as the process of bringing an invention to market.

This paper discusses principally the "invention" part of the process, and findings from OERI operations in evaluation.

RESULTS

Considerable attention in OERI operation has been given to record keeping. This was required not only because of volume but because of the need to respond as a public-service organization to queries and criticisms from many quarters. Also, availability of good records leads to improvements in process design. Two design features are particularly noteworthy:

(1) The Open-Appeal feature--evaluation of a particular invention can always be reopened with submission of additional information. Some 10-15% of all recommendations have occurred on cases which were reopened after initial rejection. Dialogue between inventors and evaluators is encouraged.

(2) The Gatekeeper Role of the OERI staff evaluator--use of consultants is an integral part of the evaluation process; our consultant staff (which is continually turning over), comprises over 250 acknowledged experts. However, consultant opinions are seen as only one input for use by a full-time staff evaluator--a trained professional engineer with skills in acquiring information and making rational decisions on the basis of engineering judgment. The decision process is unstructured and does not use numerical ratings or scores or consensus. The focus is on a single informed and practiced decision-maker.

In addition to identification data on each inventor and invention for which we have received an evaluation request, we store milestone data tracking progress of the evaluations, and data categorizing the invention by subject, patent classification, stage of development, patent status, etc. Consultant recommendations are stored together with measures of their performance (cost,

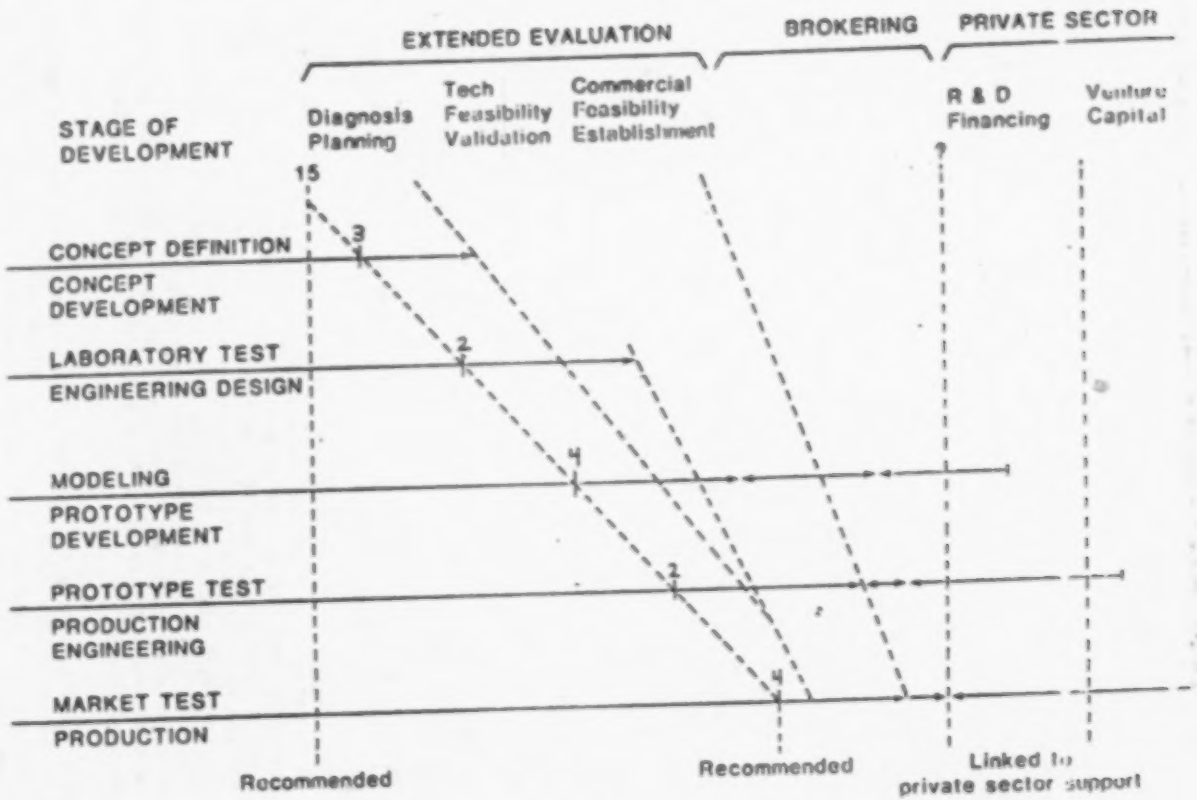
EXTENDED EVALUATION
BROKERING
PRIVATE SECTOR
STAGE OF DEVELOPMENT
Diagnosis Planning
Tech Feasibility Validation
Commercial Feasibility Establishment
R & D Financing
Venture Capital
15
3
2
4
2
4
CONCEPT DEFINITION
CONCEPT DEVELOPMENT
LABORATORY TEST
ENGINEERING DESIGN
MODELING
PROTOTYPE DEVELOPMENT
PROTOTYPE TEST
PRODUCTION ENGINEERING
MARKET TEST
PRODUCTION
Recommended
Recommended
Linked to private sector support

Figure 2

response time, and value ratings). The tracking system is being extended to include end status (market/success-failure) of recommended and supported inventions; this is to provide long-term effectiveness data and insure feedback to improve evaluation process design. A set of program statistics is included as an appendix to illustrate data available.

For several years, ERIP has been under evaluation by a group of private-sector consultants directed by the Program Evaluation Office of Oakridge National Laboratory. The evaluation assesses effectiveness of ERIP and generates information and data to assist management in increasing ERIP effectiveness.

The major effort of the group is in developing case studies--to date 60 recommended inventors have been interviewed in depth and 30 additional are to be interviewed annually. All recommended inventors are to be tracked to determine end success or failure, and reasons, and estimate societal benefits. Publications by the group are listed in References.

The evaluators have concluded that the program is meeting the design guidelines of the Congressional mandate for the program; i.e., ERIP is providing an effective route for "small inventors" to obtain Government support for their contributions to energy technology development. Further, however, their findings indicate significant societal benefits from inventions whose success in the marketplace is largely, if not solely, due to ERIP assistance.

SUPPLEMENTARY PROGRAM ACTIVITIES

Informing inventors about the program and encouraging them to make use of it is a basic program requirement. As our experience developed we found that we had to pay attention to invention quality--we had to target "serious" inventors; that inventors were had to reach--university, inventor organizations, and technical journal routes of communication were not sufficient; that inventors were poorly informed, and were not making use of existing educational and informational resources. Most significant, however, the public image of the inventor was found to be so poor that not only was he frequently an object of derision--but it carried over to his being viewed in academic, business, and financial circles with an absolute lack of credibility.

In response to this, we initiated and are conducting several subsidiary programs addressing the direct programmatic needs--the need to establish a communication network so as to better reach inventors, and the need to improve inventor education and access to information so as to improve invention quality. The results of those programs have been such as to draw attention to the needs not only of the independent inventor but generally of inventors whether they work independently, in a small company, or in a corporate laboratory.

Two additional areas are identified as warranting the attention of those who are interested in studying or stimulating the innovation process. One is to explore the feasibility of developing expert systems and other computer software as an aid to inventors to improve their ability for self-evaluation. We are looking forward to examining this area in the coming year.

The other area is related to the decision process in selecting technology for investment. Investment decisions are made by many different parties, such as

governmental agencies, venture capital groups, banking community, industry, etc. Different methods are used by each group, and within the groups different approaches are taken in evaluating technology for investment. It is clear that the methods used for evaluating technology varies. Some studies have been made on particular processes. The one in-depth research effort that we know of--an NSF funded study of their peer review system*--produced a surprising result. The report showed that the variance associated with the ratings from the population of reviewers was greater than the variance associated with the measures of quality for the grant applications; that is if the slate of the reviewers were changed there was a great chance of a reversal in the decisions made. The study recommended, as a counter to this, more direct participation in the process by the program manager. We will continue to review our process, but need to study the others so that we can take advantage of the wealth of diverse experiences.

We believe that the program has made a significant impact on technical innovation. The statistics speak well of this. However, we recognize that there is much more to be done. We look forward to this Symposium as a means for gaining additional insights into the process so that we can make further improvements.

*J. R. Cole and Stephen Cole, Peer Review in the National Science Foundation, Phase Two of a Study, National Academy Press, Washington, D.C. (1981).

APPENDIX

OERI PROGRAM STATISTICS

EVALUATION PROGRESS REPORT BY INVENTION CLASS AS OF JUL 31, 1985

CLASSIFICATION	EVALUATION REQUESTS RECEIVED	ACCEPTED FOR FIRST STAGE	COMPLETED FIRST STAGE	ACCEPTED FOR SECOND STAGE	COMPLETED SECOND STAGE	RECOMMENDED	% OF TOTAL RECEIVED	% OF TOTAL EXPECTED TO BE RECOMMENDED**
FOSSIL FUEL PRODUCTION	458	350	333	94	83	31	2.1	8.1
DIRECT SOLAR	2421	1355	1332	82	77	18	11.2	8.8
OTHER NATURAL SOURCES	1835	1290	1259	84	72	17	14.8	8.7
COMBUSTION ENGINES & COMPONENTS	2346	1507	1468	88	88	16	10.8	8.7
TRANSPORTATION SYSTEMS, VEHICLES & COMPONENTS	1778	1074	1049	73	72	26	8.2	1.5
BUILDINGS, STRUCTURES & COMPONENTS	4606	2726	2669	181	170	65	16.7	1.9
INDUSTRIAL PROCESSES	1326	1042	989	250	220	92	6.9	8.3
MISCELLANEOUS	2720	1582	1519	116	107	48	12.4	2.8
OUT OF SCOPE & UNCLASSIFIABLE	3969	136	129	0	0	0	18.3	0.0
TOTALS	21637	11062	10734	968	889	311	100.0	1.6

**FOR EXAMPLE: FOSSIL FUEL PRODUCTION $\frac{350}{458} \times \frac{94}{333} \times \frac{31}{83} \times 100 = 8.12$

EVALUATION PROGRESS REPORT BY STATE AS OF JUL 31, 1983

	EVALUATION REQUESTS RECEIVED	COMPLETED DISCLOSURE REVIEW	ACCEPTED FOR FIRST STAGE	COMPLETED FIRST STAGE	ACCEPTED FOR SECOND STAGE	COMPLETED SECOND STAGE	RECOMMENDED
ALABAMA	208	208	104	104	0	0	0
ALASKA	48	48	23	23	1	1	1
ARIZONA	318	318	203	194	21	20	2
ARKANSAS	126	126	59	58	0	0	0
CALIFORNIA	2885	2885	1472	1435	138	132	64
COLORADO	440	440	292	286	37	36	4
CONNECTICUT	440	440	242	235	19	18	9
DELAWARE	56	56	38	32	4	4	4
DISTRICT OF COLUMBIA	89	89	44	44	0	0	0
FLORIDA	1295	1295	633	619	33	29	9
GEORGIA	263	263	130	124	14	13	4
HAWAII	85	85	44	44	3	3	3
IDAHO	94	94	61	57	5	5	3
ILLINOIS	788	788	445	399	43	27	13
INDIANA	347	347	174	168	12	12	4
IOWA	185	185	81	80	3	3	2
KANSAS	232	232	100	99	3	3	1
KENTUCKY	180	180	78	77	5	5	3
LOUISIANA	238	238	112	109	11	11	6
MAINE	125	125	68	63	6	5	2
MARYLAND	378	378	362	349	35	34	13
MASSACHUSETTS	791	791	387	378	49	42	17
MICHIGAN	773	773	392	385	23	22	8
MINNESOTA	365	365	197	192	14	14	6
MISSISSIPPI	145	145	38	38	3	3	0
MISSOURI	424	424	220	216	12	11	4
MONTANA	79	79	35	34	4	4	1
NEBRASKA	108	108	52	51	7	7	4
NEVADA	102	102	48	47	3	3	0
NEW HAMPSHIRE	122	122	74	74	15	14	5
NEW JERSEY	750	750	408	401	47	44	11
NEW MEXICO	184	184	76	71	8	6	3
NEW YORK	1676	1676	920	900	72	65	22

	EVALUATION REQUESTS RECEIVED	COMPLETED DISCLOSURE REVIEW	ACCEPTED FOR FIRST STAGE	COMPLETED FIRST STAGE	ACCEPTED FOR SECOND STAGE	COMPLETED SECOND STAGE	RECOMMENDED
NORTH CAROLINA	342	342	170	168	8	8	4
NORTH DAKOTA	36	36	14	13	1	1	1
OHIO	710	710	348	342	34	32	12
OKLAHOMA	283	283	139	130	21	19	7
OREGON	445	445	214	207	16	14	4
PENNSYLVANIA	941	941	486	471	52	47	21
RHODE ISLAND	69	69	28	26	3	3	0
SOUTH CAROLINA	132	132	61	60	3	3	1
SOUTH DAKOTA	37	37	19	19	2	2	1
TENNESSEE	340	340	150	149	9	8	3
TEXAS	1016	1016	502	494	45	44	19
UTAH	170	170	73	70	7	6	4
VERMONT	70	70	48	48	8	8	2
VIRGINIA	430	430	219	209	22	22	5
WASHINGTON	530	530	257	248	14	13	6
WEST VIRGINIA	78	78	29	25	2	2	1
WISCONSIN	391	391	181	173	11	11	4
WYOMING	44	44	20	19	0	0	0
TERRITORIES	49	49	22	22	2	1	0
FOREIGN COUNTRIES	1033	1033	474	464	38	33	5
	21637	21637	11082	10734	988	899	281

	EVALUATION REQUESTS RECEIVED	COMPLETED DISCLOSURE REVIEW	ACCEPTED FOR FIRST STAGE	COMPLETED FIRST STAGE	ACCEPTED FOR SECOND STAGE	COMPLETED SECOND STAGE	RECOMMENDED
NO STATE	0	0	0	0	0	0	0

COUNTS FOR MISSING STATES INCLUDED IN GRAND TOTALS

ANALYSIS OF DATA ON NBS 1019 EVALUATION REQUEST FORM
(Requests Received and Accepted for Evaluation: 6-1-78 to 8-2-85

		Percentage	Cummulative Percentage
Total Number Accepted for Evaluation	6978		
A. Size of Company Involved			
Number received where number of employees was two or more	697	10.0	
Number received where number of employees was zero or 1	6281	90.0	
	6978	100.0	
B. Stage of Invention Development			
Concept Definition	1087	16.3	16.3
Concept Development	1649	24.7	41.0
Lab Test	251	3.8	44.8
Engineering Design	623	9.4	54.2
Working Model	977	14.7	68.9
Prototype Development	514	7.7	76.6
Prototype Test	705	10.6	87.2
Production Engineering	164	2.5	89.7
Limited Production & Marketing	431	6.5	96.2
Production & Marketing	252	3.8	100.0
Stage not Indicated	325		
	6978	100.0	674.9
C. Patent Status			
Non Patentable	162	2.4	2.4
Not Patented or Applied for	2479	36.4	38.8
Disc Doc	991	14.5	53.3
Patent Applied for	1562	22.9	76.2
Patented	1619	23.8	100.0
Status not Indicated/not clear	165		
	6978	100.0	100.0
D. Reason for Sumbitting			
Want Funds for Development	3251	73.9	73.9
Want Funds for Marketing or the Like	511	13.5	87.4
Desire only an Opinion	354	7.7	95.1
SBA Referral	22	0.5	95.6
Other	184	4.4	100.0
Reason not Indicated	334		
	6978	100.0	452.0

INVENTION STAGE OF DEVELOPMENT (6-1-78 to 8-2-85)

Stage of Invention Development	Cumulative % ot Total Inventions: All Evaluated	Reaching 2nd Stage	Recommended	Actual % Recommended
Concept Definition	16.3	8.2	2.9	2.9
Concept Development	41.0	25.1	18.5	15.6
Laboratory Test	44.8	32.4	26.0	7.5
Engineering Design	54.2	44.9	38.1	12.1
Working Model	68.9	55.7	49.1	11.0
Prototype Development	76.6	66.7	60.1	11.6
Prototype Test	87.2	80.9	74.6	13.9
Production Engineering	89.7	84.6	80.4	5.8
Limited Production & Marketing	96.2	96.3	95.4	15.0
Production & Marketing	100.0	100.0	100.0	4.6
Total Inventions in Category	6653.0	537.0	173	173.0

SIZE OF COMPANY INVOLVED (6-1-78 to 8-2-85)

Number of Employees	All Evaluated	% of Inventions Reaching 2nd Stage	Recommended
0 - 1	90.0	76.5	74.0
2 - 20	8.6	19.7	19.8
21 - 100	0.9	2.5	5.1
> 100	0.5	1.3	1.1
Total Inventions in Category	6978.0	554.0	177.0

RESULTS OF APPEAL PROCESS
(Process Decision Level)

	Accept/ Not Accept	1st Stage Evaluation	2nd Stage Evaluation
No. Originally Rejected	10735	9866	609
No. Appealed	1336	2074	274
No. Still In Process	4	93	18
Original Decision Confirmed:			
At Accept/Not Accept Level	1098	-	-
At 1st Stage Evaluation Level	215	1840	-
In Process	9	-	-
At 2nd Stage Evaluation Level	8	75	225
In Process	-	16	-
No. Recommended	2	50	31

NUMBER OF INVENTIONS RECOMMENDED BY OERI
Tabulation of COnsultant Opinions in First-Stage Evaluation
(5-7-75 to 8-2-85)

		Number of Consultants Who Said "Support" in Each Case				Total Inventions	Percentage
		0	1	2	3		
Number of Consultants Who Said "No Support" In Each Case	0	35	60	53	4	152	48.9
	1	17	58	27	2	104	33.4
	2	29	18	2		49	15.8
	3	1	4			5	1.6
	4	1				1	0.3
Total Inventions		83	140	82	6	311	
Percentage		26.7	45.0	26.4	1.9	100.0	

NUMBER OF INVENTIONS REJECTED BY OERI
Tabulation of Consultant Opinions in First-Stage Evaluation

		Number of Consultants Who Said "Support" in Each Case				Total Inventions	Percentage
		0	1	2	3		
Number of Consultants Who Said "No Support" In Each Case	0	18	80	62	6	166	1.7
	1	2453	924	66		3334	35.4
	2	5186	345	18		5549	57.1
	3	462	51			513	5.3
	4	47				47	0.5
Total Inventions		8166	1400	146	6	9718	100.0
Percentage		84.0	14.4	1.5	.1		100.0

A FEDERAL PROGRAM FOR INVENTORS
THE ENERGY-RELATED INVENTIONS PROGRAM

Marcia L. Rorke
Mohawk Research Corp.
Lake Forest, IL

Harold C. Livesay
Department of History
Virginia Tech
Blacksburg, VA

A FEDERAL PROGRAM FOR INVENTORS: THE ENERGY-RELATED INVENTIONS PROGRAM

Marcia L. Rorke

Mohawk Research Corporation
Lake Forest, IL
U.S.A.

Harold C. Livesay

Department of History
Virginia Tech, Blacksburg, VA
U.S.A.

The Energy-Related Inventions Program (ERIP) is a Federal Program that supports independent or small-business inventors. The Program has received over 23,000 submissions since 1975. Inventions found to have technical merit and commercial promise promise become eligible for Department of Energy support. The Program in effect serves as a source of pre-venture capital for inventors and small business in the United States.

INTRODUCTION

Congress established the Energy-Related Inventions Program (ERIP) in 1974, at the height of the energy crisis as a means of focusing the creative energies believed inherent in the small businesses/independent inventor communities on the country's energy problems. This belief derived not only from the traditional American faith in the creative powers of an individual, but also from the tangible fact that, as the President pleaded with the Nation to conserve energy, individuals responded by submitting their ideas for resolving the crisis to their legislators. By including this program in the 1974 omnibus energy bill, Congress established a referral point for such submissions and a process through which viable ideas might be nourished.

The Program embodied a low-cost strategy designed to unleash the creative energies of individuals and small businesses, and to provide an important service to gifted inventors. As one of the few surviving Federal innovation programs, ERIP now provides the sole source of Federal support accessible to any individual or small company inventor, regardless of the sophistication of the technology or its creator.

This Program is unusual in several ways. First, its target audience is independent inventors and small businesses with promising, energy-related technologies. Second, it is a Federal program operated jointly by two agencies: the U.S. Department of Energy (DOE) and the U.S. Department of Commerce, National Bureau of Standards (NBS).

A third unusual characteristic of ERIP is that in 1979--only four years after its creation--the program officers decided to initiate an independent, third-party assessment of the program. An assessment methodology was developed by April 1980 and the implementation began in 1981. The assessment has resulted in the generation and analysis of a great deal of data describing the program, its operation, and its results. [Rorke, 1982, 1984, 1985a; Soderstrom, 1982, 1983, 1984, 1985]. More importantly, program officers have utilized the information to make operational changes.

The Legislation

ERIP was established by Section 14 of the Federal Non-nuclear Energy Research and Development Act of 1974 (PL 93-577), which directed the National Bureau of Standards (NBS) to assist the Energy Research and Development Administration (now the U.S. Department of Energy) by evaluating promising energy-related inventions. The section specified that: "particular attention" be paid to those inventions "submitted by individual inventors and small companies for the purpose of obtaining direct grants from the Administrator [ERDA]"

In March 1975, the Director of the NBS testified before the congress that ERDA and NBS personnel had cooperatively developed a program plan and a public information strategy, had decided on preferred methods of funding, and had devised mechanisms to assure coordination of the respective agencies' policies. By June 1985 the Federal Register listed the program and its functions-- ERIP was open for business. When the program began, more than 100 requests awaited evaluation, and they have been submitted at an average rate of 200 a month ever since. As of October 1985, NBS had received and processed over 23,000 applications; of these, it had recommended 325 inventions for DOE support.

DESCRIPTION OF THE PROGRAM

The Clientele

The legislation establishing ERIP also mandated its target audience as "all promising energy-related inventions, particularly those submitted by individual inventors and small companies...." Although this does not specifically exclude the possibility of support for technologies submitted by larger firms, NBS in fact has rarely recommended an invention emanating from any source other than the primary categories specified in the legislation.

Both agencies have sought energetically to reach and to serve these designated groups, since the Program's viability depends upon the commercialization of some respectable percentage of the submissions, which depends upon the number of quality inventions submitted. To this end, the Program disseminates its materials widely through appropriate channels and at selected meetings, including the NBS-DOE sponsored National Innovation Workshops held six times a year at various locations around the country. Effective "outreach" remains a bedeviling problem, however, because the staff can only know with certainty how participants heard of the Program; the size of the unreached audience and the best method to get to it remain matters of speculation. Based on a survey of the participants to date, independent inventors outnumber small companies, and the latter may constitute an under-tapped source of potentially viable technologies.

Program Operation

The Office of Energy-Related Inventions (OERI) at the National Bureau of Standards and the Inventions and Innovations Programs at the Department of Energy jointly operate the ERIP. NBS evaluates all submitted inventions and recommends to DOE those judged to be technically sound, and commercially feasible. DOE reviews all recommended inventions to determine if Federal assistance can be provided; if it can, a program staff member negotiates a statement of work, and administers a grant award.

National Bureau of Standards The function of the NBS, as defined by the Congress, is to assist the DOE by evaluating energy-related technologies

submitted to the Program. To fulfill this function, NBS employs several staff engineers, supported by a network of over 250 individuals in private practice, universities, and government laboratories.

The NBS evaluation process has several noteworthy characteristics. The evaluators often perform a significant technical service by helping unsophisticated inventors organize their presentations (and thus their thoughts). If rejected during the evaluation, inventors may re-submit if they can supply new, additional, or better information, and 13% of the inventions recommended thus far to DOE were, at one time or another, rejected during evaluation. Finally, NBS can and will take a chance on particularly promising technologies by resolving ambivalent evaluations in favor of the inventor.

Supplementary NBS activities related to ERIP include program development and support, as well as special efforts to increase the number and improve the quality of submissions by sponsoring the National Innovation Workshop series, and encouraging the formation of inventor organizations.

Department of Energy Support As the recommended technologies pass from NBS to DOE, the primary administrative task shifts from evaluating technical merit to determining the type of DOE support best calculated to move the technology toward the market. In operational terms, this translates into shifting the emphasis on the invention (NBS) to an emphasis on the inventor (DOE), for experience has shown that the inventor's experience, abilities, and preferences constitute a crucial variable in the choice of best commercialization strategy. Since the Program accepts submissions from everyone, and has learned that technical creativity flourishes at all levels of education, expertise, and innovative experience, DOE staff members have had to deal with marketable technologies submitted by inventors ranging from the grade-school educated through holders of Ph.Ds in engineering.

DOE staff members begin the process by analyzing the NBS recommendation, then contacting the inventor to open negotiations on the type and amount of support (if any) to be provided. Inventors, especially those with technologies at an early stage of development, invariably have needs that exceed DOE's capacity for support, and often fall outside DOE policy guidelines. Grants have ranged from $20,000 to $200,000, averaging about $70,000, most granted to support technical research, scientific testing, or business planning. DOE cannot support marketing efforts, although it can help inventors obtain market information. As the program has evolved, the DOE staff has sought ways to fine-tune financial support to the needs and abilities of individual inventors and their technologies, and to expand the range of non-financial services.

ERIP Assessment

The independent, third-party review, commissioned in 1980 and ongoing since 1981, provides the principal mechanism for program assessment. The assessment effort develops and analyzes a body of qualitative and quantitative data obtained through direct contact with inventor participants in the Program. These direct contacts take two forms. First, on-site interviews, from which in-depth case studies are produced. By the end of fiscal year 1985, the evaluators had conducted ninety of these interviews, updated in 1985 by telephone contacts with previous years' interviewees. Budgetary constraints have precluded on-site interviews with a scientifically random sample, but by the end of 1985, the profile of the interviewed sample closely matched that of the total recommended population in terms of geographic distribution and types of technology.

Second, all other recommendees that could be located were interviewed by telephone during the summer of 1985, thus completing a 1985 survey of the entire population of participants (excluding the 10% who couldn't be found), using a standardized questionnaire.

The information derived through the interviews answers three kinds of questions: it determines whether the Program complies with its legislated mandate; it measures the effectiveness and efficiency of Program operations and pinpoints areas that need improvement; and it addresses specific problems posed by Program officers, such as whether funding levels used have appropriately matched the needs and potential of inventors and inventions. Obviously the information gathered is based primarily upon the declarations of the participants as interpreted by the assessment team, with all the inherent liabilities of such a process. The accumulated information, however, has provided DOE with important data to guide program development efforts, and a survey of foreign inventor-support support programs enriches the context in which the ERIP data are analyzed. [Livesay (1983)]

DEVELOPMENTAL HISTORY OF THE PROGRAM

One of the first DOE program directors perceived the ERIP as a pre-venture capital program. The NBS evaluated technologies, reduced the risk, and made them attractive investments. The Federal government, in his opinion, was responsible for bringing technologies that met the legislated ERIP criteria to a stage where the private sector would finance final development and commercialization. This thinking has remained the cornerstone of the program and has evolved into a philosophy summarized by the current program director as "helping each inventor help himself."

As the ERIP developed and available funding fluctuated, it became apparent that in order to deploy its limited assets most effectively, the Program staff needed information about the innovation process in smaller, private sector firms. The assessment team undertook to gather such information and discovered that little of the existing body of knowledge about the innovation/product development process dealt with the problems of individual inventors with technologies in the pre-venture stage.

With ERIP support, the team launched an effort to gather the necessary information. For example, the Program convened a meeting of licensing executives and asked them what kind of information was generally available to assist smaller firms to market their technology via licensing. The answer turned out to be "almost none," for while the Licensing Executives Society publishes a periodic journal (Les Nouvelles) that occasionally contains an article on small business licensing activity, it is not accessible to the general public, nor written for the layperson. Confronted with this obstacle, the ERIP commissioned a literature review by a law firm specializing in licensing technology. The resulting pamphlet [Rorke and Livesay, (1985b)] identifies and annotates literature available to and easily understood by innovators. Program officers now distribute this document to all those inventors recommended for support by the NBS.

In the crucial area of financing, three years of ongoing discussions with formal and informal investors developed basic information on the financing of new technology. The information derived, translated into layperson's terms for ERIP participants, is now distributed on a regular basis by Program personnel. [Rorke, (1985b)]

The shortage of information about new product development by inventors and small businesses has compounded an operational dilemma that the variety of recommendees and technologies has presented to the DOE staff. Each inventor

presents a unique mix of personality and qualifications, while the limited staff size dictates some standardization of approach. Ideally, DOE should have a set of options in size and timing of funding and of non-financial services that can be assembled into an optimal support package tailored to individual inventors' needs. Accordingly, both the DOE staff and its external consultants have tried to identify and weigh the determinant variables in the commercialization of new technologies. Conclusions remain preliminary, but salient factors include the inventor's previous entrepreneural experience (far more important than technical expertise as a predictor of commercial success), the technology's stage of development when it is submitted to DOE, and the type of product involved (i.e., industrial process, consumer durable, etc.)

All this information, added to the material generated by the Program review constitutes an unusual body of material on contemporary inventors and their activities. The data base being generated by this Program thus, if properly analyzed, could serve as a foundation for other programs, private or public sector, and, hopefully, will also inform appropriate segments of the business community on the needs and potential of American inventors.

FIVE INVENTORS' EXPERIENCES WITH ERIP

The variety of ERIP recommendees show the persistence of vigorous technical creativity in individuals throughout the socio-economic spectrum. A brief look at five inventors' experiences with ERIP provides a sense of the variety of people and technologies that enter the Program, the services that the Program provides, and some of the Program's strengths and weaknesses.

A Kentucky Coal Miner

Among the more successful ERIP participants, one finds a Kentucky coal miner with a high-school education. Crawling up mine shafts, dragging cinder blocks to build brattices (a dam that prevents noxious gases from accumulating in quantities sufficient to asphyxiate the miners or blow up the mine), the same thought struck him as had struck so many inventors before him, "The hell with this; there's gotta be a better way."

Although he had no previous experience as an inventor, the miner set to work and devised an aluminum brattice--light-weight, cheap, easily assembled, and capable of flexing under subsidence. After his patent lawyer told him about ERIP, the inventor submitted his idea to NBS because, although he thought he had developed something novel, he didn't have the resources to find out for sure. The NBS evaluation provided him with that assurance and, it turned out, a great deal more, for NBS's outside consultant was an articulate and respected authority on mine ventilation; his enthusiastic endorsement of the new brattice gave it an industry-wide credibility that proved indispensable.

DOE provided equally effective support, arranging for a test of the brattice in the mines of the Peabody Coal Company (the dominant corporation in the industry), supplying the funds to build twenty-five of the brattices, and orchestrating the entire test process. The brattice so impressed the Peabody Coal ventilation engineer involved that he wrote an article in Coal Age that provided an added validation.

Despite these endorsements, and successful development of the brattice in a variety of sizes and designs suitable to the wide range of conditions in mines, it took the inventor five years to negotiate a licensing agreement with a manufacturer that has the production capacity and sales know-how required. A world-wide market exists for the brattice, estimated at about $90 million annually, and the inventor realized from the outset that his

mining experience didn't qualify him to manufacture or sell his product in such a large, diverse, and geographically dispersed market.

The ERIP functioned particularly well for this inventor because it validated his concept and financed development of marketable prototypes. Above all, it connected him and his invention to indispensable people--recognized international authorities in mine ventilation technology that the inventor himself almost certainly could not have found. Despite his lack of formal education and business experience, the inventor had a shrewd sense of his own talents and limitations, and made decisions accordingly. Crucial to his eventual success, he understood the nature of his market, the kind of product it required, and the production and sales capacity prerequisite to success. The DOE coordinator understood these things as well, and selected an appropriate strategy in which the key element was persuading Peabody Coal to cooperate in the product tests.

A Preacher Turned Inventor

A North Carolina preacher, who abandoned the pulpit for beakers and retorts when he inherited a small, family-owned chemical business, offers another example of the importance of ERIP's ability to open corporate doors.

Told by one of his customers that millions of pounds of fiberglass get thrown away annually because the resin used to bind the fibers together prevented recycling the trimmings from mats, rolls, and filters, the inventor recognized an enormous opportunity.

After some months of searching for a cheap, effective solvent, he gave up and tossed several wads of fiberglass onto the lab shelf in disgust. Working late one night on a customer's order for rust inhibitor, he opened the lab window to get some fresh air. A breeze blew one of the wads of fiberglass off the shelf into a beaker of citric acid solution. And there it was, proof, according to the inventor, that "The Lord takes care of his fools," for he discovered when he fished out the fiberglass that the solution had stripped it clean of resin.

The next step required building a machine to incorporate the chemical process into a continuous operation. A small-scale model demonstrated to the inventor's satisfaction that he could scale up his innovation to industrial size, but that it would require more capital than he had at his disposal. He therefore submitted his project to ERIP.

The NBS evaluation proved no obstacle: "I just put a beaker on that ol' boy's desk and showed him it worked." DOE provided the money to build a pilot plant, which the inventor, flashing the skills of the experienced entrepreneur, stretched a long way indeed. Needing some stainless steel tanks, for example, he scouted the countryside, found some in a bankrupt textile mill, called the banker, and said, "You got some ol' tanks out there I'd like to have, I'll give you $8,000 for all three of them." "Go out and get 'em," replied the banker, only to call a few days later and say, "Man, you done hoodooed me. Those tanks are stainless steel, and worth $30,000 apiece." "Naw," said the inventor, "you done hoodooed your own self, and anyway, they was only worth $8,000 when I bought 'em."

Through such shrewd uses of the ERIP grant, the inventor succeeded in building an industrial-scale pilot plant that worked smoothly in test runs on hundreds of thousands of pounds of scrap fiberglass. Having such a process, however, and convincing fiberglass manufacturers to try it, let alone buy it, are different matters altogether. Fortunately for the inventor, his DOE coordinator talked a major manufacturer into installing

the innovation and making test runs at one of their plants. Without the credibility lent by the NBS evaluation and the test results from the DOE-sponsored pilot plant, this door, which the inventor had knocked on fruitlessly before, might have remained forever closed.

DOE assistance went further. The coordinator took the inventor to the world's largest manufacturer of fiberglass machinery. This company, after some tests, decided to license the technology and become its worldwide distributor. One fiberglass manufacturer has already bought a license to install the process, and others are negotiating.

The inventor himself is on his way to being a multi-millionaire, while his process will cut costs of fiberglass manufacture, and solve a major environmental problem--burying tens of millions of pounds of waste fiberglass annually. In this case, ERIP provided several crucial services. The NBS technical evaluation provided credibility, reinforced by the test results form the DOE-funded pilot plant. Without DOE assistance, the process would have remained a "bridesmaid" technology, for the inventor had insufficient resources to scale up his invention. In this case, as in the case of the mine brattice, DOE opened doors into the corporate world that the inventor himself had failed to get through. Once inside, the inventor's skill as an entrepreneur enabled him to take advantage of the opportunity.

An Inventor Dead-ended in Steel

A less happy outcome attended the efforts of a Washington state inventor who developed a simple device to save energy in steel manufacture. The energy crisis provided a direct and specific impetus for this inventor, who decided to look for ways to save energy when the 1973 crisis caused a dimming of the lights in his hometown. He knew the steel business best, having spent most of his life in it. After some thought, he developed a bi-level chamber in which the heat from cooling ingots on the ground floor pre-heated scrap iron on the second floor. DOE financed the design and construction of a demonstration unit, and arranged for tests at a California steel mill. The trial proved a resounding success; the inventor soon concluded an agreement with a Tennessee iron and steel company whereby the firm installed the device and the inventor got paid a percentage of the value of the energy saved.

This arrangement has made money for everybody concerned, but the first sale turned out to be the only one so far because in this case, as in several other ERIP steel technologies, the industry has refused to adopt it; indeed, has generally refused even to look at it. Whether because of the industry's intransigence, or because, unlike the fiberglass case, DOE personnel don't know whom to approach and how, this technology remains largely unused, despite its technical and economic soundness. By and large, overseas producers have shown a greater interest in steel technologies than American manufacturers have, but the Program has as yet developed no linkages through which to market ERIP technologies overseas. Attitudes of the inventors themselves have created an additional obstacle to exporting ERIP innovations, for many of the Program's grantees want their technologies to help their homeland, and have an ingrained hostility to selling abroad even if they knew how, which of course most of them don't.

An Alchemist Inventor

One innovator who could sell abroad, but has thus far refused is the Massachusetts inventor of a process that hardens polymer panels. The youngest child of a large Italian-American family (and the only one of the younger generation who never attended college), this inventor would have felt

at home in Edison's laboratory, because he works intuitively, testing by trial and error.

Having picked up some knowledge of photochemistry while working in the family industrial lamp business, the inventor first got interested in the hardening of polymer in response to a Department of Defense project in the portable manufacture of polymer pipe. Realizing that the market for polymer components in automobiles, computers, and other industries would likely expand exponentially, and that the hardening process in common use (oven baking) took a lot of time, consumed vast quantities of energy and money, and produced erratic quality material, the inventor began "messing around" with new methods. Eventually he developed a process that hardened the plastic by "hitting" it with a pulsing, high-intensity light.

This method achieved in seconds what the oven process required hours to accomplish, thus cutting the cost dramatically. Equally important, the new technique cut the rate of defects to a fraction of the existing norm. Later, the inventor improved results even further by surrounding the material with a magnetic field. When asked why he added the magnetic field, he replied, "Oh, I don't know. Something just told me it might work."

With his limited resources, the inventor could only build a unit too small to have industrial application. And when he attempted to find capital to build a larger model, this inventor could not explain to potential investors why the thing worked. An MIT professor denounced the invention as "alchemy," while another authority claimed it must be a trick because he didn't understand it. Unsurprisingly, no venture capitalist volunteered to finance further development, despite the fact that several of them agreed that the potential market was so large as to be "beyond calculation."

Having nowhere to turn, having used up all the resources that he, his family, and the firm's employees could contribute, he applied to ERIP. No one involved in the ERIP evaluation could explain in terms of the chemistry involved why the machine worked; however, unlike the venture capitalists, the Program decided to take a chance. NBS recommended support and DOE supplied the funds to build a larger-scale prototype. In addition, DOE arranged to have a unit installed at the Ford Motor Company, where it has now performed for several years hardening automobile components.

Trade journal articles describing the dramatic success of the process soon brought customers and prospective licensees from the U.S. and abroad. The latter the inventor has consistently refused to do business with. "I didn't invent this thing to see it get into foreigner's hands," he says. "We need all the technology we can get right here in the United States." Unhappily, the inventor faces bankruptcy because he thus far has refused to part with his technology to a licensee, and hasn't been able to raise the capital required to manufacture it in quantity himself. "We make great recipes around here," his brother says, "but nobody knows how to cook." This shortcoming has has proven a crippling liability for this ERIP grantee.

The Program's staff, having no power to force the inventor to conclude a licensing agreement, can only offer advice and hope for the best. The technology has made it into the market in limited quantities. In time, it will become commonplace because the inventor's financial condition will force him ultimately to yield to one of the many major corporate suitors eager to put the device into mass production. The inventor says he has learned his lesson, that he was "never a businessman and never wanted to be." "From now on," he says, "I'm staying in the laboratory. I've got a great idea for a magnetic powered car."

The Pure Inventor

Another ERIP grantee learned a similar lesson, despite the fact that he holds an MIT PhD and always understood precisely why his creations worked. Motivated by the skyrocketing price of fuel oil in the early 1970s, this inventor perceived a major market opportunity presented by New England's aged housing stock, heated largely by oil furnaces. He devised an electronic control that enabled a "zonal control" of temperatures in houses heated by hot water radiators.

With ERIP help, he built several prototypes, installed them in a variety of locations, and accumulated test results dramatic enough to justify (or so he thought) creating a company to manufacture the invention. He got all the technical help he needed through his connections in the MIT "old boy network" around Boston. Unfortunately he discovered that "Few MIT people have any business sense and what's worse, a lot of them have negative business sense." Eventually he attracted the interest of a venture capitalist who promised "to take me public, but only after I'd put in everything I owned."

Then came the fateful summer of 1981, when "oil prices went down, interest rates went up, the venture capitalist went who the hell knows where, and I went bankrupt." All this, he says, taught him a lesson worth all the trouble--he's no businessman, he's an inventor, and he'll never mix up the two again. Without ERIP support, he wouldn't have tried to produce his "zonal control" device, but "I might have tried something else a lot more expensive and the result would have been the same."

Recovering from bankruptcy, this gentleman has stuck to what he knows best, designing a series of electronic devices that he has sold in the concept or scale model stage, leaving the manufacturing, "to the guys who know how to do it." The lesson he learned as a result of his ERIP participation might be called a negative one, but it has had long-run positive results. Clearly, a window of opportunity existed for this technology, not only in the minds of ERIP people, but also in the opinion of the venture capitalist. Circumstances beyond anyone's control slammed the window shut, as it often has in purely private sector ventures as well. Falling prices confounded plenty of experts, in government and out of it, and a program specifically mandated to focus on "energy-related" technologies will always remain vulnerable to the volatility of that particular market.

Summary

These examples, and many others that could be offered illustrate some of the things the Program can and cannot do. It can provide credibility and open doors, but it cannot overcome industry-wide myopia, nor can it open doors it cannot find. Its resources can produce dynamic results in the hands of a skilled businessman, but may in fact perform even more vital services for business neophytes by making them aware of their shortcomings and suggesting ways to surmount them. It can put its participants in touch with experts, but it cannot force the inventors to listen to the advice they receive. It can take a chance on a problematical technology, but it can't force anyone else to follow suit. It can help an inventor perfect his technology, but it can't force him to part with it.

Above all, the ERIP can, and often does, provide crucial assistance to innovators whose technology has technical and commercial potential, but hasn't yet reached the stage of development required to attract private investment. If in fact a continuing stream of technological innovation forms an indispensable ingredient of a healthy, competitive economy, and individuals and small businesses can make a disproportionate contribution

to this stream, then ERIP reflects a mission entrusted to the Federal government since its inception: supporting those activities necessary to the general welfare, but beyond the capacity of individuals to accomplish. This mission persuaded President Thomas Jefferson, who once said "Let our workshops be in Europe," to use Federal funds to subsidize an American inventor's efforts to create a system of manufacture using interchangeable parts. None of ERIP's inventors may turn out to be another Eli Whitney, but together they may make a vigorous contribution to the country's welfare, and the possibility legitimizes the effort involved.

CONCLUSIONS

ERIP's joint administrative structure has created problems as well as strengths. In the Program's early years, inventors didn't understand the functions of the two agencies, and expected DOE money to follow hard on the heels of the NBS recommendation. When delays ensued, when DOE staffers confronted recommended inventors with demands for new and different kinds of information, when funding fell short of inventors' expectations or didn't materialize at all, recommendees often felt misled and in a sense betrayed. Filling this information gap, and reducing the delay inherent in passing from one Federal department to another, are problems to which the Program officers have recently given high priority, but which have improved only gradually. [Rorke and Livesay (1985a)]

The Program's structure incorporates a flaw that has sometimes led it to encourage inventors to go on when they might have been better advised to cut their losses and abandon their projects. This problem has emerged in several cases in which the technology was sound and the inventor talented, but the timing poor. For example, one of the recommendees perfected an automobile pollution control device superior to the catalytic converter, but by the time it entered the Program, the window of opportunity had closed because the industry had made an irrevocable commitment to the catalytic system, leaving the inventor stranded. Other technologies supported by ERIP have no conceivable market potential until such time when and if energy prices rise steeply and permanently above current levels. For these, the window of opportunity lies sometime in the future. Because these technologies met the Program's criteria, including having market potential under some circumstances, they obtained Program support that might have been used to better effect elsewhere.

This phenomenon of inventions meritorious but ill-timed points to another inherent problem in the Program, the problem of market knowledge. Given the limited number of DOE personnel available for this program and the enormous diversity of the inventions recommended, many of the technologies lie in fields outside the staff's market expertise; therefore, to say the ERIP personnel have demonstrated an astonishing breadth of knowledge and versatility in making market judgments, and that the staff's limited knowledge has resulted in erroneous assessments (both pro and con) as to the commercial potential of many technologies, is to utter no contradiction whatever.

Despite these problems, the ERIP has achieved some significant results. From is inception through the end of Fiscal Year 1985, the Energy-Related Inventions Program evaluated over 23,000 submitted inventions. From these, NBS winnowed 325 promising technologies and recommended them to DOE. With the Program's assistance, dozens of these have made progress toward the market and more than forty have entered commercial production and generated sales.

According to Oak Ridge National Laboratories, which compiles and analyzes statistical data on market performance, cumulative sales of recommended technologies exceeded $100 million through the end of Fiscal Year 1984, had created 1,000 direct jobs, and attracted $41 million in private investment in 1984 alone. In addition, spin-offs for alternative applications of Program-supported technologies produced an estimated additional $160 million without requiring an additional Federal dollar. Whatever the precise economic impact of this Program activity may be, a conservative estimate, using a multiplier of three to calculate total economic activity generated by ERIP inventions in the market, and a 10% estimate for Federal tax revenues returned, suggests that the Program has repaid 150% of its total Congressional appropriations since its inception. [Soderstrom (1985)]

The sheer volume of inventions submitted has demonstrated that the independent inventor survives in America. According to its participants, The Program's existence gives these inventors hope, an impact summarized by one of them: "They [the ERIP staff] believed in me when nobody else did." Moreover, practically all of the inventors interviewed by the assessment team (almost half of the NBS recommendees in the Program) had come to the Program as the resource of last resort; that is, they had exhausted (or seriously depleted) their own resources and had had no success in finding support from formal capital sources. The foregoing might suggest that the Program serves as a public support agency for private sector losers, but the number of its technologies entering the market argues otherwise.

In addition, experience with the Program encourages some first-time inventors to move beyond their first project and seek further marketable innovations. For example, the ERIP participant who successfully marketed a system to recycle waste fiberglass, plans to continue applying his creative talents to the problem of profitably recycling other industrial wastes.

The ERIP has succeeded, according to many of its participants, in inducing some inventors to refocus their creative efforts on energy problems. The pattern of submissions to the Program has also shown that many inventors have perceived the R&D vacuum associated with the decline of basic industries such as steel, and have attempted to convert this situation into an opportunity for innovation. With ERIP assistance, some of these technologies, such as the steel innovation described above, have proven their worth technically and economically. By and large, however, basic American industry has rejected these technologies, forcing inventors to find markets abroad.

The extent to which the Program can positively affect the energy situation and the health of the economy obviously depends upon the extent to which its projects enter the market. Unhappily, American industry has a tendency to favor short-term risk minimization, sometimes at the expense of longer-term potential profit maximization, an attitude reflected in resistance to new technologies, even when they have demonstrated technical and economic merit. American technical creativity has often foundered on this attitudinal reef. ERIP participants, as individual inventors, have few resources with which to assault the barrier. The Program has tried to fill this gap, and while ERIP's impact remains small in terms of the economy as a whole, this is still perceived to be quite cost-effective relative to its modest size.

to date
The Program's success rate (40 marketed technologies/out of 325 recommended, with several others on the verge of commercial success) suggests that NBS has done a good job of selecting and DOE an effective job of supporting the quality fraction of the large number of inventions submitted. Indeed, the record seems all the more remarkable in light of the fact that the Program has supported early-stage and, therefore, high-risk innovations. Based on the comments of the inventors themselves, and on what is known of the bleak

financial landscape that confronts innovators with pre-venture ideas, it seems likely that many of these technologies would never have reached the market without ERIP assistance.

Among the many benefits the Program provides to its participants, one stands out above all others--credibility. The NBS evaluation has served many inventors as a kind of "Good Housekeeping Seal of Approval" that they converted into a bankable asset. One inventor parlayed the NBS evaluation into an endorsement by, and financial support from, a state agency, then went on to build a business that sold $32 million worth of his product. Another testified that he "couldn't get a venture capitalist to talk to him" until he had the NBS evaluation and DOE support as credentials. In fact, when asked what benefits the Program provided them, "credibility" was the answer most often given by inventors --after cash, of course--and many have declared the credibility more important than the money.

Finally, ERIP will, in time, provide a test of the value of an ongoing program assessment. Based on the assessors' annual reports, the Program has modified and expanded its operations, seeking to facilitate and expedite inventors' progress, tailoring its operations to fit more closely the needs of particular inventors, and supporting the creation of various documents and workshops designed to educate inventors in the commercialization process. Longitudinal tracking of the participants should reveal whether, in fact, these adjustments have made the Program more effective.

On balance, the Energy-Related Inventions Program has made a modest but worthwhile contribution. The Program has encouraged independent inventors, supported worthwhile technologies at the pre-venture stage, added to the national stock of technology, and bolstered the private sector economy. In addition, its assessment has compiled a unique body of information about an important dimension of the innovation process, while accumulating convincing evidence that the private sector will not in fact move all commercially viable innovations from concept stage through development and into the market.

Better yet, it has done all this at no net cost to the taxpayers, and demonstrated in the doing that the Federal government, huge as it may be, can nevertheless devise and operate programs that provide meaningful help to individual citizens, to the benefit of the society as a whole. As one ERIP staff member told an audience of inventors, "This Program may convince you that when someone says, 'I'm from the government; I'm here to help,' it may not be a bad joke."

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NBSIR 86-3405

REPORT OF TESTS ON JOSEPH NEWMAN'S DEVICE

Robert E. Hebner
Gerard N. Stenbakken
David L. Hillhouse

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards
National Engineering Laboratory
Center for Electronics and Electrical Engineering
Electrosystems Division
Gaithersburg, MD 20899

June 1986

U.S. DEPARTMENT OF COMMERCE, Malcolm Baldrige, *Secretary*
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, *Director*

FOREWORD

This report fulfills a request by the U.S. Patent and Trademark Office that the National Bureau of Standards conduct tests on Joseph Newman's device as part of a lawsuit involving Mr. Newman and PTO. The tests were conducted following an agreement between PTO and NBS and were carried out in accordance with several court orders.

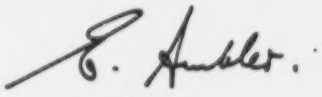
Specifically, NBS was asked to prepare a report on its tests, including:

> "(a) a copy of the final test plan including pictures of the working models;
>
> (b) a description of the credentials and qualifications of the NBS experts;
>
> (c) a description of the test equipment used and when and how it was calibrated;
>
> (d) a detailed description of the working models;
>
> (e) a detailed description of the conduct of the tests; and
>
> (f) the test results including the percentage of the input energy that is converted to output energy by each of Mr. Newman's working models."

The test plan was submitted before we began our tests and is on file with the United States District Court for the District of Columbia. The remaining items are covered in this report.

Our results are clear and unequivocal. As the report states, "At all conditions tested, the input power exceeded the output power. That is, the device did not deliver more energy than it used."

NBS believes that this report is responsive to the several court orders. It is also clear that our test results are entirely consistent with well-established laws of physics. NBS can think of no way that this or any other device could be constructed or operated to violate either the principle of conservation of energy or the Second Law of Thermodynamics.



Ernest Ambler
Director

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STATEMENT OF FINDINGS

This report describes electrical measurements performed by the National Bureau of Standards on Joseph Newman's device. The tests were conducted between March and June 1986 at the request of the U.S. Patent and Trademark Office in accordance with several court orders. As a Federal science and engineering research laboratory that specializes in measurements and is responsible for maintaining U.S. standards for electricity, NBS has extensive experience and facilities for measuring the performance of electrical equipment.

The purpose of the measurements was to test the inventor's claim that the output power from the device was greater than the power which was supplied to the device from a battery pack. NBS was not requested to examine the theory behind the operation of the device.

The tests consisted of electrical measurements of the power drawn from the battery pack by the device (input power) and separate as well as simultaneous measurements of the output power. These measurements were done with several different sets of conventional, well-documented test instruments. Due to the specialized nature of the equipment, however, the instrumentation would not generally be found in most research laboratories. The electrical characteristics of the device, especially the sharp spikes in input and output waveforms, necessitated a variety of extensive and careful measurements and experimental checks to ensure that valid data resulted. Equipment selection was critical.

The device's efficiency -- defined as the ratio of output power to input power -- varied depending on the voltage, load on the device, and the degree of degradation of the tape on the commutator of the device. If the device simply transferred the power from the batteries to the load, its efficiency would be 100 percent; in no case did the device's efficiency approach 100 percent.

At all conditions tested, the input power exceeded the output power. That is, the device did not deliver more energy than it used.

Report of Tests on Joseph Newman's Device

1. Introduction

This report describes results of tests performed between March 1986 and June 1986 on Joseph Newman's device. The purpose of the testing was to determine if the output power from the device was greater than the power which was put into the device from the battery pack. This report describes the experimental tests which were performed and summarizes the results.

This report describes a set of test results on a single device. NBS was not requested to examine the theory behind the operation of the device.

A photograph of the device which was tested is shown in figure 1. The system, as tested, consisted of a battery pack, a commutator which was mechanically connected to a rotating permanent magnet, and a coil of wire. The National Bureau of Standards provided the resistive load which was connected in parallel with the coil. Figure 1 does not show the battery pack and the load. The commutator reversed the polarity of the battery connection twice during each rotation of the magnet. In addition, twenty-four times during each rotation it connected the battery to and disconnected it from the coil of wire and the load. Consequently the output waveform was a series of pulses as is shown in figure 2.

The tests consisted of electrical measurements of the net power drawn from a battery pack by the device under test coupled with separate as well as simultaneous measurement of the power dissipated in a resistive load connected in parallel with the coil of the device.

Section 2 of this report describes the design of the tests and the selection of instrumentation used. Section 3 presents the measurement results. Sections 4 and 5 outline the consistency checks which were performed and provide estimates of the uncertainties associated with the various measurements performed. Section 6 presents conclusions and section 7 is a list of references cited in the report.

2. Experimental Approach

2.1 Introduction

Because this device was tested as a unique device, one element of the experimental approach was to assure the validity of the results by providing at least two independent, or nearly independent, measurements of both the input and the output power. To select the appropriate instrumentation, it was necessary to carry out preliminary investigations of the input and output waveforms. For both the input and the output, the waveform consisted of a series of twenty-four pulses, with the series repeating at approximately one- to two-second intervals. In addition, the crest factor (i.e. the ratio of the peak pulse amplitude to the root-mean-square value of the waveform) was found to be as large as about ten. Many types of instrumentation do not respond correctly over the observed frequency range and crest factor range, so the

Figure 1. Photograph of Joseph Newman's device which was delivered to the National Bureau of Standards

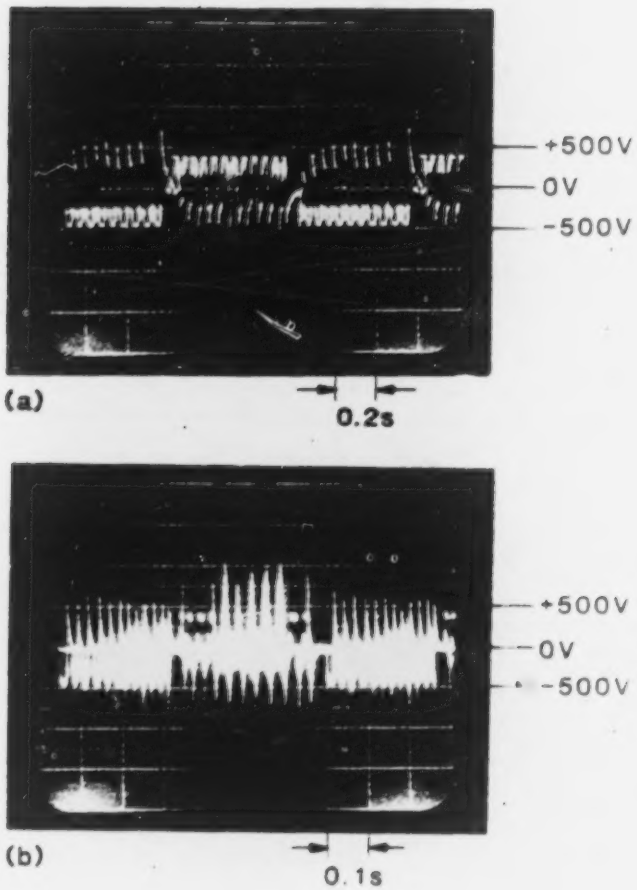

Figure 2. Photographs of two examples [(a) and (b)] of output waveform of device under test as measured using an oscilloscope

selection of the measurement equipment was especially important. The measurement approaches which were used at the National Bureau of Standards to acquire the data reported were appropriate for the waveforms measured.

A further consideration is that the waveforms changed with time, both in terms of the shapes of the individual pulses and in terms of the repetition interval. This variation results, at least in part, from the erosion of the tape (see section 2.2) on the commutator.

2.2 Brief Description of the Device under Test

The system which was evaluated consists of three primary components: the power source, a battery pack; the commutator, which is mechanically connected to a magnet which rotates during normal operation of the device; and the coil. The battery pack consists of 116 nine-volt batteries arranged in five sets of twenty batteries and one set of sixteen batteries. The batteries in each set are connected in series and external wiring is used to connect these various sets in series. The battery pack was provided by Mr. Newman.

During the testing, it was determined that one of the batteries in one of the sets was defective. After this battery was removed, the battery pack operated reliably.

Testing was performed at two different voltage levels. One of these levels was a nominal open circuit voltage of 1000 volts (the maximum available from the battery pack) and the other was a nominal open circuit voltage of 800 volts. These voltage levels decreased by about 50 to 150 volts when the battery pack was connected to the device.

A drawing of the commutator is shown in figure 3. The body of the commutator wheel is constructed from a plastic material. The outer edge of the wheel is covered by a metallic strip. This strip is split into two semicircles which are separated by small plastic spacers. Twelve pieces of tape are attached to one of the semicircles. These pieces of tape are arranged so that alternate, approximately equal, segments of the semicircle are covered and exposed. Two brushes contact the wheel about 180° apart. Each of these brushes is connected electrically to one of the two leads of the coil. There is a small slip ring on each side of the wheel. The sliding contact on one of the slip rings is connected to the grounded side of the battery. This slip ring is connected to the semicircle which does not have tape on it. The sliding contact on the other slip ring is connected to the positive terminal of the battery pack. This slip ring is connected to the semicircle which does have tape on it.

This commutator operates so that during one half of a revolution one side of the coil is connected to the anode (positive terminal) of the battery pack while the other side is connected to the grounded cathode (negative terminal) of the battery. During the other half of the revolution, the side of the coil which had been connected to the cathode is now connected to the anode and the side which had been connected to the anode is now connected to the grounded cathode. During each half cycle, the twelve pieces of tape alternately cause the battery anode to be connected to and disconnected from the coil.

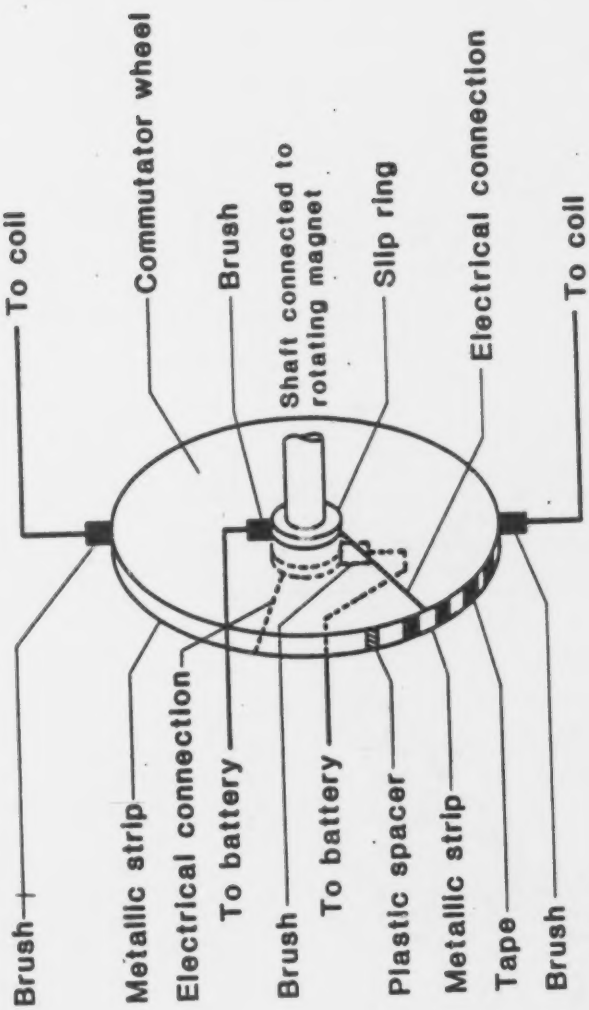

Figure 3. Schematic drawing of commutator

The commutator wheel is mechanically connected to a permanent magnet which is rotated by the magnetic field of the coil. The permanent magnet is supported along its axis of rotation by bolts which pass through holes in the wooden support structure. The device vibrated as its magnet rotated.

A small spark is produced each time either of the sliding contacts passes from a conducting surface to a tape-covered surface or a plastic spacer. After a period of operation, it was noted that this spark burns the insulating material. For this reason, one of the plastic spacers had to be replaced during the course of the testing and the tape had to be replaced frequently with fresh, cellulose acetate tape. It was noted that the efficiency of the device under test was dependent upon the condition of this tape (i.e. as the tape eroded, the efficiency of the device decreased). Two consequences of this behavior were that the device is not characterized by a single efficiency -- its efficiency is variable -- and that it was necessary to replace the tape frequently because the highest efficiency was obtained with fresh tape.

The coil appears to be constructed of many turns of fine wire. To characterize the coil, the impedance of the coil as a function of the frequency (when sinusoidal signals were applied) was measured. The resulting data are consistent with an interpretation that below about 100 hertz the coil acts as an inductor, with an inductance of about 2500 henries, while above about 1000 hertz it acts as a capacitor, with a capacitance of about 850 picofarads. The structure of the response between 100 hertz and 1000 hertz is presumably due to the combination of resistance, capacitance, and inductance within the coil.

2.3 Input Power Measurements

The input power measurement system, as shown in figure 4, consists of a voltage divider (R_1 and R_2), a current shunt (R_{CS}), and appropriate instrumentation to obtain the product of the voltage and current waveforms. The voltage divider has a high impedance network which consists of a 5-megohm resistor and a parallel capacitance of 6 picofarads. The low impedance arm of the divider is a 50-kilohm resistor. The load on the divider is approximately 6 meters of coaxial cable to a low-pass filter and to two measuring instruments, each having an input impedance of 1 megohm. The resistance of the high impedance element was selected to minimize the power dissipated in the divider. The parallel capacitance was then chosen to obtain a uniform frequency response, to within ±2%, for frequencies up to 5000 hertz.

A current shunt having a resistance of 100.1 ohms was selected to provide appropriate signal levels. Measurements showed that for both direct current and 50-hertz alternating current signals, the shunt maintained its nominal value to within a few tenths of a percent for currents in the range from 1 to 50 milliamperes.

The output signals from the divider and shunt were measured using both a sampling wattmeter and an analog-multiplier wattmeter. The sampling wattmeter was a wideband precision meter developed by the National Bureau of Standards [1]. A block diagram of the wattmeter is shown in figure 5. The instrument has two voltage input channels, and it can calculate and display the average of the product of the two input voltages. One of these input voltages, V_2, is derived from the current shunt and the other, V_1, is derived from the voltage

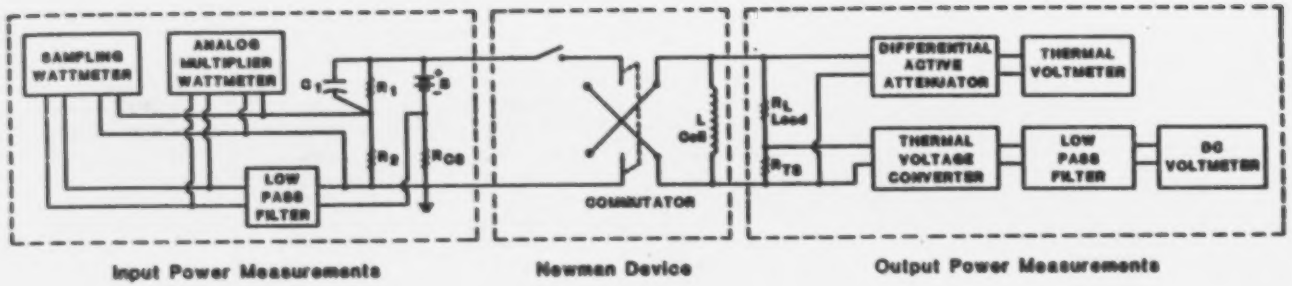

Figure 4. Schematic drawing of Newman device and input and output power measurement circuits

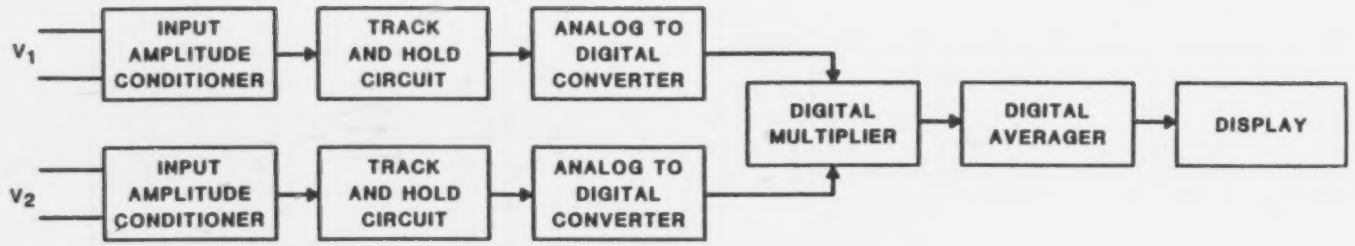

Figure 5. Block diagram of sampling wattmeter

divider. The displayed value, with proper scaling, shows the amount of power drawn from the battery. Using appropriate software, the sampling wattmeter can also be used to measure either the average or the root mean square (rms) value of a signal applied to either channel.

Each input channel consists of the three circuit elements shown schematically in figure 5. First, the input-amplitude-conditioner circuit scales the input signal to a level which is appropriate for the remaining circuitry. Second, the track-and-hold circuit samples an instantaneous value from the input circuit and holds that value at its output. Third, the analog-to-digital converter transforms the value of the analog signal to an appropriate digital signal. As soon as the digital signal is determined and transmitted to the following circuitry, the track-and-hold circuit takes a new sample of the input signal which is transformed into the next digital value. Thus, a sequence of digital signals flows from each channel and the value of a specific digital signal is proportional to an instantaneous sample of an input signal.

The digital signals from each channel are applied to the inputs of a digital multiplier. The multiplier calculates the product of the two signals. These product values are transmitted to a digital averager which determines the average value of a large number of these inputs. The average values, which are proportional to the power drawn from a source or delivered to a load, are displayed on the front panel.

The analog-multiplier wattmeter is a commercial instrument which was modified so that it could accommodate an external current shunt. Originally, the instrument had a voltage input channel and a current input channel. The input current was passed through an internal current shunt to generate a voltage signal of the proper amplitude. The signal on the input voltage channel was scaled using a voltage divider.

As shown in the schematic diagram of this instrument in figure 6, these two signals are applied to the input terminals of an analog multiplier circuit. The output of the multiplier is proportional to the product of the two input signals. This signal is filtered using a low-pass filter and applied to the input of an analog-to-digital converter. The digital output is simultaneously directed to both a front panel digital display and to a digital interface circuit. For most of the data taken during this investigation, the digital output was recorded using a computer to "read" the signal at the digital interface connector. This digital signal is proportional to the power drawn from a source or delivered to a load.

As figure 6 shows, the instrument was modified for this application by disconnecting the voltage signal from the internal current shunt to the multiplier circuit. In place of the signal from the internal shunt, the signal from a new voltage attenuator is applied to the multiplier circuit. This attenuator receives its input V_2 from the external current shunt R_{CS}. Thus, with proper scaling, the value of the display shows the power drawn from the battery.

Because of some very large spikes in the current waveform, a low-pass filter was used on the current signal to both the sampling wattmeter and the analog-multiplier wattmeter. The filter prevented the spikes from producing a

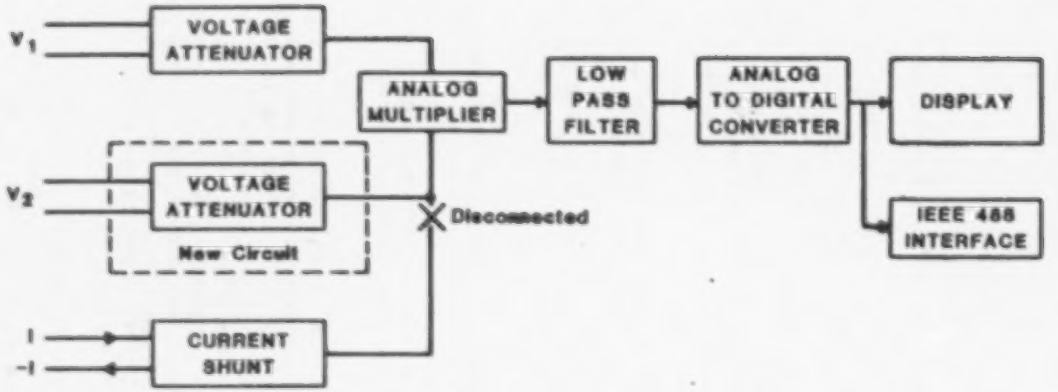

Figure 6. Block diagram of analog-multiplier wattmeter

significant measurement error. The use of the filter results in the determination of the input power which is lower than the true value. To determine the signal loss due to this circuit, matching sets of high-pass and low-pass filters were constructed. The results of measurements using these filters are given in section 4.2. Figure 7 is a schematic diagram of the high-pass and the low-pass filters. The filters were constructed using a resistance of 1000 ohms and a capacitance of 20 nanofarads.

2.4 Output Power Measurements

The output power was the power dissipated in a resistive load R_L connected in parallel with the coil of the device under test, as shown in figure 4. Two values of resistive load were constructed: nominally 50,000 ohms, and 200,000 ohms. By using series and parallel combinations of resistors of these values tests were run at nominal loads of 400,000 ohms, 200,000 ohms, 150,000 ohms, 100,000 ohms, and 50,000 ohms. Most of the data, however, were taken at 200,000 ohms or 50,000 ohms. The 200,000-ohm level was selected because at this point the power dissipated in the load and the power dissipated in the device under test were approximately equal. The 50,000-ohm level was selected as the smallest value of the resistance that could be used routinely without potentially damaging the device; one of the goals of the test program was to perform only nondestructive measurements. A significant source of potential damage was the vibration of the device, which increased as the value of the load resistance decreased.

To determine the power dissipated in the load resistor R_L, three different approaches were used. The first was the differential active attenuator diagrammed in figure 8. This attenuator, which was constructed at the National Bureau of Standards, produced a signal at its output which was proportional to the voltage difference across the resistive load. This output voltage was measured using a commercially available digital voltmeter. This voltmeter incorporated a thermal element. A thermal element [2] is among the basic tools used in the determination of the rms (root-mean-square) value of a voltage waveform. The thermal element consists of two primary components: a heater which changes temperature with changes in the current being passed through the element and a thermocouple to produce a voltage which is proportional to the temperature. The power dissipated in the load is the square of the rms voltage across the load resistor divided by the resistance value of the resistor.

The second approach uses a thermal element which is not a part of a commercial instrument. In this case, a shunt resistor R_{sh}, nominally 100 ohms for a 50,000-ohm load, is placed in parallel with the thermal element. This combination is then connected in series with the load. In this configuration, the thermal element is "floating", i.e. depending on the instantaneous position of the commutator, the thermal element may be near ground potential or it may be near the maximum voltage of the battery. The output from the thermocouple in the thermal element was passed through a low-pass filter and was measured using a digital voltmeter. This thermal element is calibrated by applying a known voltage signal across the thermal element and its associated resistor and recording the output voltage from the thermocouple. The voltage across the load resistor is calculated by recording the output from the thermocouple, computing the voltage across the thermal element and the associated resistor from the calibration data, and calculating the voltage

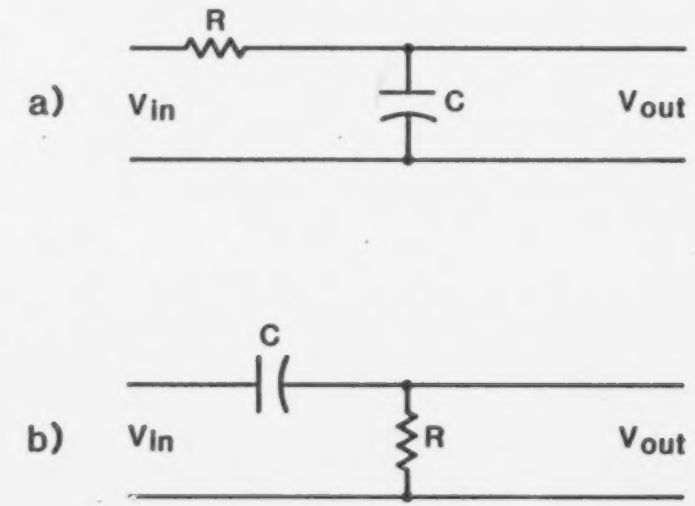

Figure 7. Low-pass (a) and high-pass (b) filters

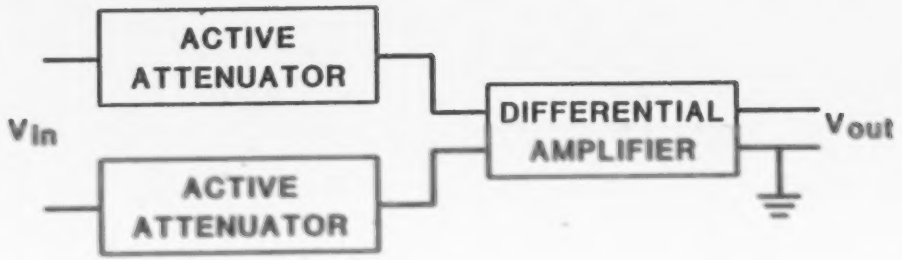

Figure 8. Block diagram of differential active attenuator

across the load resistor by multiplying the thermal element voltage by the resistance ratio of the load resistor to the parallel combination of the shunt resistor and the resistance of the thermal element. The power is then obtained by squaring this voltage and dividing it by the value of the load resistance.

The third measurement technique used is shown in figure 9. This resistance configuration had the advantage of being convenient to use and conceptually simple. Because one side of the coil was nearly always connected to ground, significant current would flow only through the 200,000-ohm resistor which was connected to the side of the coil which was not connected to ground. Thus, as the commutator reversed the connections to the coil, the two resistors would alternately carry current. But, as is discussed in section 5.3, because the switching sequence of the commutator disconnected the coil from ground once each rotation, this measurement technique always produced a value of the output power which was too large so that the measured value of the efficiency was always greater than the true value. This configuration was called the BI-200 because it was composed of two load resistors R_{L1} and R_{L2} each having a resistance of 200,000 ohms.

3. Results

The results of the various measurements of the input power and the output power are summarized in Table 1. The efficiency is defined as the ratio of the output power to the input power expressed in percent and the internal loss is defined as the difference between the input power and the output power. It should be noted that the efficiency and the internal losses are two related measures of the effectiveness of the device.

The two measured values of the input power were averaged to obtain the uncorrected efficiency data and the internal losses. In the remarks column in Table 1, "Atten." indicates that the output measurement was made using the active attenuator, "TE" indicates that the output measurement was made using the thermal element and shunt, and "BI-200" indicates that the output measurement was made using the BI-200 load, in parallel with other resistors as necessary. The quantities "800 V" and "1000 V" are the nominal open circuit voltages of the battery pack. The entries in the column labeled "uncorrected efficiency data" are the ratios of the measured powers while the "corrected efficiency results" have been corrected for the known offsets. This column shows the estimated uncertainty of the measurements.

The corrections and uncertainties associated with these measurements are discussed in section 5. For convenience, the results of that discussion are summarized here. For the active attenuator, it is estimated that the true efficiency is within ±4% of the measured value. The values measured using the thermal element are estimated to be 3±4% larger than the true value. Similarly, the values measured with the BI-200 load are about 10±6% larger than the true values. This means, for example, that if the value of the efficiency measured using the active attenuator is listed as 41% the true value is between 37% and 45%. If the value taken using the thermal element is listed as 54%, the true value is between 45% and 53%. Finally, if the value was measured as 77% using the BI-200 load, then the true value is between 61%

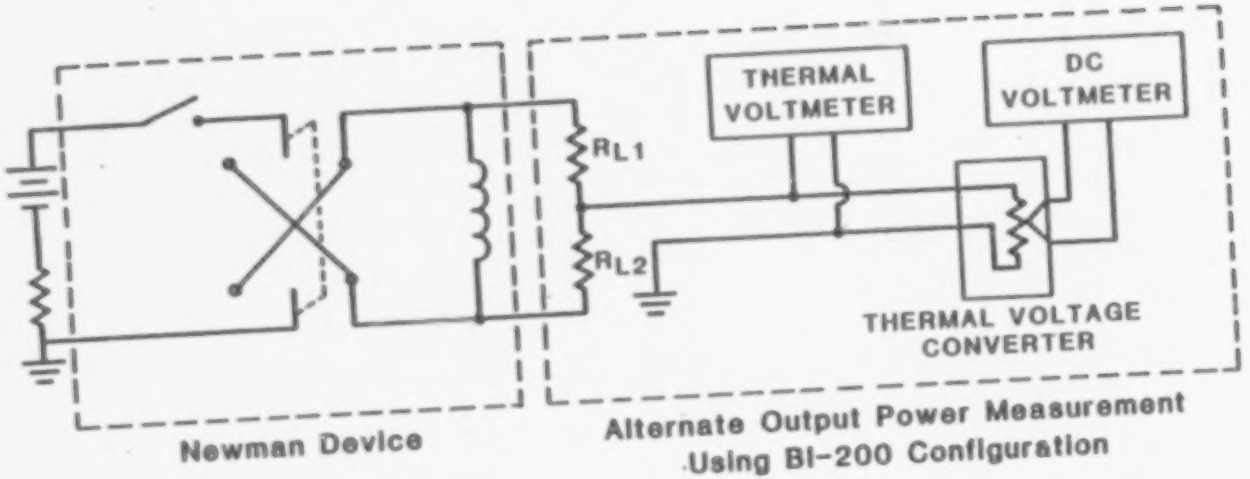

Figure 9. Schematic diagram of measurements using BI-200 Load

and 73%. No corrected efficiency is given for the two measurements made using the BI-200 as a load and the attenuator to measure the voltage across the load because no experimental data were taken to provide direct support for any corrections or uncertainty estimates. From other data and from a knowledge of the circuit, it is estimated that the uncertainty is no smaller than was obtained for the attenuator measurements using other loads and that the offset should be smaller than that obtained using the BI-200 alone. The variation of the efficiency under nominally identical conditions is greater than would be expected due to measurement uncertainty because, as was mentioned in section 2.2, the efficiency is not constant.

Table 1. Summary of measurement results

LOAD RESISTOR	UNCORRECTED EFFICIENCY DATA	CORRECTED EFFICIENCY RESULTS	INTERNAL LOSSES	REMARKS
Ohms	Percent	Percent	Watts	
400,000	29	29 ± 4	2.5	Atten., 800 V
	30	30 ± 4	2.5	Atten., 800 V
	34	29 ± 4	2.4	TE, 800 V
	33	30 ± 4	2.3	TE, 800 V
200,000	41	31 ± 6	3.0	BI-200, 800 V
	39	29 ± 6	3.9	BI-200, 800 V
	45	35 ± 6	2.4	BI-200, 800 V
	44	34 ± 6	2.4	BI-200, 800 V
	27	---	3.1	BI-200 + Atten., 800 V
	38	28 ± 6	2.7	BI-200, 800 V
	27	27 ± 4	3.0	Atten., 800 V
	39	29 ± 6	2.3	BI-200, 800V
	27	27 ± 4	3.0	Atten., 800 V
	45	35 ± 6	2.6	BI-200, 800 V
	39	39 ± 4	2.6	Atten., 800 V
	44	34 ± 6	2.5	BI-200, 800 V
	39	39 ± 4	2.7	Atten., 800 V
	45	40 ± 4	2.3	TE, 800 V
	42	42 ± 4	2.3	Atten., 800 V
	45	40 ± 4	2.2	TE, 800 V
	42	42 ± 4	2.3	Atten., 800 V
	35	30 ± 4	2.5	TE, 800 V
	33	33 ± 4	2.6	Atten., 800 V
	35	30 ± 4	2.5	TE, 800 V
	33	33 ± 4	2.6	Atten., 800 V
	41	31 ± 6	2.6	BI-200, 800 V
	36	36 ± 4	2.9	Atten., 800 V
	34	---	3.1	BI-200 + Atten., 800 V
	45	35 ± 6	2.4	BI-200, 800 V
	39	29 ± 6	3.9	BI-200, 1000 V
	46	41 ± 4	2.4	TE, 1000 V
	41	41 ± 4	2.7	Atten., 1000 V
	45	40 ± 4	2.5	TE, 1000 V
	40	40 ± 4	2.7	Atten., 1000 V

(continued)

Table 1. Summary of measurement results (continued)

LOAD RESISTOR Ohms	UNCORRECTED EFFICIENCY DATA Percent	CORRECTED EFFICIENCY RESULTS Percent	INTERNAL LOSSES Watts	REMARKS
150,000	44	34 ± 6	3.0	BI-200, 800 V
	48	38 ± 6	3.7	BI-200, 1000 V
	33	33 ± 4	3.4	Atten., 1000 V
	37	32 ± 4	3.2	TE, 1000 V
	32	32 ± 4	3.3	Atten., 1000 V
	37	32 ± 4	3.1	TE, 1000 V
100,000	54	49 ± 4	2.3	TE, 800 V
	46	46 ± 4	2.6	Atten., 800 V
	53	48 ± 4	2.3	TE, 800 V
	46	46 ± 4	2.6	Atten., 800 V
	52	47 ± 4	2.7	TE, 1000 V
	50	50 ± 4	3.0	Atten., 1000 V
	50	45 ± 4	3.1	TE, 1000 V
	47	47 ± 4	3.1	Atten., 1000 V
50,000	53	53 ± 4	3.1	Atten., 800 V
	55	50 ± 4	3.0	TE, 800 V
	52	52 ± 4	3.3	Atten., 800 V
	54	49 ± 4	3.4	TE, 800 V
	50	50 ± 4	3.2	Atten., 800 V
	54	49 ± 4	3.1	TE, 800 V
	51	51 ± 4	3.2	Atten., 800 V
	55	50 ± 4	3.0	TE, 800 V
	59	59 ± 4	2.6	Atten., 800 V
	63	58 ± 4	2.4	TE, 800 V
	59	59 ± 4	2.6	Atten., 800 V
	64	59 ± 4	2.3	TE, 800 V
	53	53 ± 4	3.0	Atten., 800 V
	59	54 ± 4	2.7	TE, 800 V
	53	53 ± 4	3.0	Atten., 800 V
	59	54 ± 4	2.8	TE, 800 V
	59	59 ± 4	2.6	Atten., 800 V
	64	59 ± 4	2.4	TE, 800 V
	60	60 ± 4	2.5	Atten., 800 V
	64	59 ± 4	2.4	TE, 800 V
	40	40 ± 4	4.9	Atten., 1000 V
	54	49 ± 4	3.7	TE, 1000 V
	41	41 ± 4	4.9	Atten., 1000 V
	55	50 ± 4	3.6	TE, 1000 V
	73	63 ± 6	2.9	BI-200, 800 V
	77	67 ± 6	2.4	BI-200, 1000 V

When the 50,000-ohm load resistor was used with the BI-200, the load on the device was a parallel combination of the two systems. Therefore, the value of

the load was 40,000 ohms during most of the cycle and 44,000 ohms when the commutator disconnected the ground from the coil without disconnecting the battery.

4. Consistency Checks

4.1 Introduction

In the development of measurement techniques, it is necessary to provide certain checks to verify that unanticipated errors have not corrupted the data. For conventional measurement systems, an experienced metrologist will identify any deviations from the normal behavior for a particular class of device. For one-of-a-kind devices, it is customary to make some explicit checks to provide additional assurance that the measurement results are correct within the stated uncertainties. The following paragraphs describe such consistency checks for measurements made on the Newman device.

4.2 Assessment of the Frequency Dependence of the Input Power

As mentioned previously, the input power was measured using a low-pass filter on the input current channel. To determine the effect of the filter, matched sets of filters were constructed. One set was a pair of high-pass filters; the other set was a pair of low-pass filters. Both sets had 3-dB points (50% reduction) at 8000 hertz. Thus if one were measuring the power using the low-pass filters, one would be measuring approximately the power at frequencies below 8000 hertz and when using the high-pass filters, the power above 8000 hertz. The results of such measurements are summarized in Table 2.

Table 2. Effect of high-pass and low-pass filters on input power measurements using the sampling wattmeter on various ranges for the current channel

FILTER	CURRENT RANGE Arbitrary Units	POWER Watts
High Pass	10	66×10^{-3}
	20	84×10^{-3}
	50	108×10^{-3}
	100	110×10^{-3}
Low Pass	20	3.7
	50	3.9

Two observations can be drawn from these data. First, the power measured using the high-pass filters is less than 3% of the power measured using the low-pass filters. This result shows that the measured efficiency should be less than 3% larger than the true efficiency of the device under test. Second, the measured power using the high-pass filters increased as the current range increased. This trend suggests that, in this frequency range, there are high amplitude signals which saturate the input circuit and produce measurement errors at the lower ranges. It is not feasible to measure power using the higher current ranges because most of the signal is at lower

amplitude and large measurement errors can occur if low amplitude signals are measured using a high amplitude range. Thus, to minimize and to control measurement error, the data were taken using a low-pass filter.

4.3 Approximate Determination of the Input Power

Because the battery voltage is nearly constant (implying that the average voltage is nearly equal to the rms voltage), the product of the average current and the voltage should nearly equal the input power. To test this relationship, measurements were made using the sampling wattmeter to determine the input power, the rms voltage, and the average current. The results, which show that the product of the voltage and the current approximates the measured power, are summarized in Table 3.

Table 3. Comparison of power measurement to the current-voltage product in the determination of the input power

VOLTAGE RANGE	CURRENT RANGE	V_{rms}	I_{ave}	MEASURED POWER	$V_{rms} x I_{ave}$
Arbitrary Units	Arbitrary Units	Volts	Amperes	Watts	Volt-Amperes
2	2	806	5.2×10^{-3}	3.9	4.2
2	5	805	5.3×10^{-3}	4.1	4.3
2	10	802	5.3×10^{-3}	4.3	4.3
2	20	801	5.6×10^{-3}	4.4	4.5

4.4 Measurement of the Input and the Output Power Using the Sampling Wattmeter

In addition to the various tests, calibrations, and consistency checks performed, it is good practice to demonstrate that no systematic offsets occurred between the instrumentation used to measure the input power and that used to measure the output power. Measurements, therefore, were made to identify any significant offset. These consisted of input measurements using the sampling wattmeter and the analog-multiplier wattmeter followed by measurements of the output using the active attenuator. The signal from the attenuator was measured using the digital voltmeter (DVM) which was used in subsequent measurements and also by the sampling wattmeter. These measurements, summarized in Table 4, demonstrate that the various instruments gave about the same indication under the same conditions.

Table 4 Measurement of the input and the output using the sampling wattmeter

NOMINAL LOAD	MEASURED POWER (Watts)			
	Input		Output	
(Ohms)	Analog Multiplier	Sampling Wattmeter	DVM	Sampling Wattmeter
∞	3.5	3.5-4.2	--	--
500,000	--	--	0.7	0.7
50,000	8.2	7.7	4.2	4.2

4.5 Spectrum Analysis

A commercially available spectrum analyzer was used to measure the frequency content of the output voltage. This measurement was made using an NBS-developed divider which had a submicrosecond response time. The divider was attached to one terminal of the coil and the spectrum of the divider output voltage was measured. This measurement showed that most of the energy in the signal was in the frequency region below 50 hertz. At 500 hertz, the signal level was 1% of the low-frequency level.

These results were not used directly in the analysis of the data, but taken in conjunction with the other measurement results help to corroborate the observation that the power flow in the device is primarily a low frequency phenomenon.

4.6 Direction of Power Flow

The sign of the measured input power indicated that the battery pack was supplying net power to the device or, equivalently, that the device was not charging the battery pack. That is to say, power was flowing from the battery to the device-under-test and not from the device-under-test to the battery. To demonstrate that the signs were correct, a nominal 1-megohm resistor was placed in parallel with the device-under-test and the appropriate commutator brush was lifted so that no power was able to flow into the device. In this configuration the power was clearly flowing from the battery to the resistor and the measured polarity of the power flow was the same as it was when the battery powered the device-under-test.

4.7 In Situ Measurement of the Output from a Signal Generator

To assure that there were no unanticipated errors due to the arrangement and interconnection of the various measurement systems in the laboratory, an in situ calibration check was performed. All of the measurement systems were connected with cable runs in the same position used for measurement, except that no connections were made to the device-under-test. A signal generator was used to apply a signal to a parallel combination of the voltage divider with the current shunt, a shunt used with the thermal element and a 200,000-ohm load resistor, all connected in series. The power delivered to this combination was measured using the sampling wattmeter, the analog wattmeter, the thermal element, and the voltmeter used to measure the output from the active attenuator. Measurements using these systems differed by less than 1%.

5. Uncertainty Estimates

5.1 Introduction

In this section, the primary sources of measurement uncertainty are identified and their magnitudes are estimated. Two different kinds of uncertainty limits are discussed. One is an offset and the other is variations in the repeatability of the measurements which are represented as random errors. The sign convention used is that a positive offset produces a measured result which is larger than the true value of the parameter while a negative offset produces a measured result which is smaller than the true value. The

basis for the estimation of the offsets is described below. The limits for random variation, designated "±", are bounds which will include almost all repeated measurements. The following five measurements are evaluated: the input power using the sampling wattmeter; the input power using the analog-multiplier wattmeter; the output power using the active attenuator; the output power using the thermal element; and the output power using the BI-200 load.

5.2 Uncertainty and Offset in Input Power Measurements

The input power was measured using the sampling wattmeter and the analog-multiplier wattmeter. The primary sources of measurement error and their estimated magnitudes are listed in Table 5.

The low-pass filter introduces error because the higher frequency components of the power are measured with a consistent offset. As discussed in section 4.2, this error is such that the input power is consistently underestimated. The data support an estimate of -3% for this error.

The power dissipated in the voltage divider is between 0.1 and 0.2 watt depending upon the voltage level used. The percentage of the input power represented by this quantity depends on the load and the condition of the tape on the commutator. For this reason, this error was identified as being partially a systematic offset and partially a random error.

Table 5. Estimated offsets and uncertainties in input power measurement

ERROR SOURCE	SAMPLING WATTMETER	ANALOG-MULTIPLIER WATTMETER
Low-pass filter	-3%	-3%
Power dissipated in the voltage divider	+3%±2%	+3%±2%
Scale factor calibration	±0.4%	±0.2%
Frequency response of the voltage divider	±0.2%	±0.2%
Voltage dependence of the voltage divider	±0.2%	±0.2%
Averaging duration errors	±1.0%	±1.0%
Frequency response of the current shunt	±0.2%	±0.2%
Amplitude dependence of the current shunt	±0.2%	±0.2%
Induced signals	±1.0%	±1.0%

The calibration of the scale factors for both the sampling wattmeter and the analog wattmeter was performed by applying known signals from a commercially

available calibrator to the input terminals of the instruments. The values listed are the residual errors which were not accounted for in the calibration of the devices. It can be seen from Table 5 that the error due to this source was small compared to errors arising from other sources. This observation underscores the fact that a knowledge of the scale factors is necessary, but not sufficient, for a reliable measurement.

As noted in section 2.3, the calibration of the voltage divider indicated that variations in its frequency response are less than ±2% up to 5000 hertz. Because the bandwidth over which significant power is drawn is smaller than 500 hertz, a smaller error is estimated.

As a portion of the voltage divider calibration, the voltage dependence of its response was measured. These measurements indicated that the divider ratio changed by less than 0.1% as the voltage was increased from 300 volts to 1000 volts and was maintained at 1000 volts for five minutes.

To determine the average power, one must average over exactly one or an integral number of cycles or must average over a very large number of cycles so that the effect of any fractional cycle is negligible. The averaging duration error was estimated by noting the variation of successive measurements taken within a few minutes of each other. Since the averaging intervals are uncorrelated with the operation of the device, a major contributor to the difference in successive readings can be attributed to the averaging error. The measurement results obtained support an estimate of ±1% for this uncertainty.

The current shunt was a 100-ohm, non-inductive resistor. The stray capacitance is below the value which would affect the measured value of the input power by more than 0.2%.

As a portion of the calibration of the system, the amplitude dependence of the response of the current shunt was measured. The data obtained indicated that, over the range from 1 to 50 milliamperes, the response did not change by as much as 0.2%.

By use of appropriate grounding and shielding techniques, the induced signals, or "noise", did not contribute more than 1% of the measured input power. As will be seen in section 5.3, "noise" was a more significant factor in the output measurement.

5.3 Uncertainty and Offsets in Output Power Measurement

The output power was measured using an active attenuator, a thermal element, and a special resistive load called the BI-200. The estimated uncertainties for each of these measurement approaches are listed in Table 6.

The power dependence of the various loads was measured using a commercially available calibration source. No resistance value changed by as much as 0.6% from very low power to the maximum power measured in these tests.

The active attenuator was connected by short, shielded leads to the load. These shielded leads combined with a shielded attenuator and operation at relatively high voltage made this device less sensitive to induced signals

than other approaches. It is possible that the induced signal contribution is even smaller than estimated, but the short-term instability of the device under test makes it difficult to demonstrate that a smaller effect has been achieved. During some of the tests using the thermal element, the input to the thermal element was shorted and the device still indicated a power which was 3% to 8% of that which was measured without the short, indicating that this effect always gives rise to a measured value which is larger than the true value. That measurement is the basis for the induced signal offset and associated uncertainty estimates. The induced signal component using the BI-200 load results from the fact that during one polarity reversal of the commutator (and not both) the ground is disconnected from the coil before the battery is disconnected. In this situation, the coil has 400,000 ohms rather than 200,000 ohms in parallel with it. This contribution, will always yield a measured value of the output power which is larger than the true value. From photographs of the waveform and from comparison measurements, it is estimated that the offset is about 10% with an uncertainty of ±5%.

Table 6. Estimated offsets and uncertainties in the output power measurements

ERROR SOURCE	ACTIVE ATTENUATOR	THERMAL ELEMENT	BI-200
Power dependence of the load	±0.6%	±0.6%	±0.6%
Induced signals	±2%	+5±3%	+10±5%
Averaging duration errors	±1%	±1%	±1%
Scale factor errors	±0.6%	±0.6%	±0.2%
Frequency response of loads	±0.3%	±0.3%	±0.3%

The considerations which contributed to the assignment of averaging duration errors and scale factor errors are the same as those for input error measurement. In addition, an in situ check of the thermal element and the active attenuator was performed by applying a known voltage to the resistive load with the device-under-test disconnected. Each measurement system agreed with the input value to within 1%.

The contribution of the frequency response of the loads was estimated from comparisons of the direct current and 50-hertz calibration of the systems. These data showed that the frequency dependence was less than 0.3%.

5.4. Offset and Uncertainty in Efficiency Determination

Adding the systematic offsets and calculating the square root of the sum of the squares of the random errors provides an estimate of ±2.5% for the uncertainty of the measurement of the input power for each instrument. Using the same approach to calculate the output offset and uncertainty yields an estimate of ±2.5% for the active attenuator, +5%±3% for the thermal element, and +10%±5% for the BI-200. To estimate the uncertainty in the efficiency determination, the square root of the sum of the squares of the random

components of the input and output uncertainties is computed and added to any net offset. In this way, the following offsets and uncertainties in the efficiency determination are obtained: active attenuator, ±4%; thermal element, +5%±4%; BI-200, +10%±6%. It should be emphasized that the uncorrected values of the efficiency in Table 1 obtained using the thermal element and the BI-200 are larger than the true values of the efficiency.

6. Conclusions

The device's efficiency -- defined as the ratio of output power to input power -- varied depending on the voltage, load on the device, and the degree of degradation of the tape on the commutator of the device. If the device simply transferred the power from the batteries to the load, its efficiency would be 100 percent; in no case did the device's efficiency approach 100 percent.

At all conditions tested, the input power exceeded the output power. That is, the device did not deliver more energy than it used.

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APPENDIX

This appendix contains a description of the credentials and the qualifications of the authors of this report.

ROBERT E. HEBNER

EDUCATION:

St. Marys University, San Antonio, TX	B.S.--Physics, 1967
University of Missouri	M.S.--Physics, 1969
University of Missouri	Ph.D.--Physics, 1971

EMPLOYMENT HISTORY:

1978 - present	Supervisory Physicist, National Bureau of Standards
1973 - 1978	Physicist, National Bureau of Standards
1972 - 1973	Presidential Intern, National Bureau of Standards
1971 - 1972	Postdoctoral Position, University of Missouri

PROFESSIONAL ACTIVITIES:

Member, IEEE Subcommittee on High Voltage Test Techniques, 1974 - present.

Member, IEEE Task Force on Varistors and Avalanche Diode Protective Devices, 1977-78; Task Force Secretary, 1978

Technical Advisor, EPRI-sponsored Project to Measure Transients in Electrical Transmission Systems, 1977-1982

Consultant, Geophysical Fluid Dynamics Laboratory, Princeton University, concerning protection against power line surges, 1977

Chairman, IEEE Working Group on Liquid Insulation, 1979-81; Member, 1981-82

Member, NSF Review Panel for Engineering Research Equipment Grants, 1979

Member, ADCOM IEEE Electrical Insulation Society, 1982 - present

Member, Education Committee, IEEE Electrical Insulation Society, 1982 - present

Member of the Advisory Committee and Group Leader, NATO Advanced Study Institute; Fast Electrical and Optical Diagnostic Principles and Techniques, 1983

Member, National Research Council's Committee to Conduct an Assessment on Establishing Underwater Arcs and Flames, 1985

PROFESSIONAL SOCIETY MEMBERSHIPS:

American Association for the Advancement of Science
American Physical Society
Institute of Electrical and Electronics Engineers
Sigma Xi

Robert E. Hebner (continued)

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GERARD N. STENBAKKEN

Education:

University of Minnesota	B.Phy. (1964)
University of Maryland	M.S. (1969)

Employment Information:

1969-present	Physicist, National Bureau of Standards
1963-1969	Engineer, Vitro Laboratories

Professional Activities:

Member, IEEE Subcommittee on Digital Techniques in Electrical Measurements, 1983-present;

Secretary/Treasurer, IEEE Washington/No.Va, Instrumentation and Measurement Chapter 1984-present.

Professional Society Memberships:

Institute of Electrical and Electronic Engineers

Publications:

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DAVID L. HILLHOUSE

Education:

University of Missouri	B.S.E.E. (1950)
University of Missouri	M.S.E.E. (1952)

Employment Information:

1967-present	Physicist, National Bureau of Standards
1952-1967	Electrical Engineer, General Electric

Professional Activities:

Member, IEEE Instrument Transformers Subcommittee

Chairman, Workshop on Metering Accuracy Coupling Capacitor Voltage Transformers, 1983

Professional Society Memberships:

Institute of Electrical and Electronics Engineers
Instrument Society of America

Publications:

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